AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION 2008

Mathematics Paper I

Time allowed: 40 minutes Marks 30

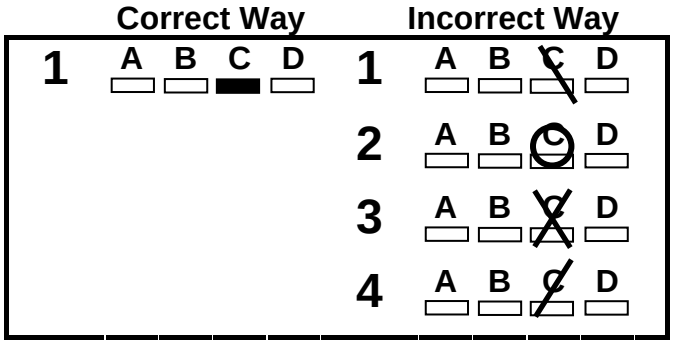
INSTRUCTIONS

1. Read each question carefully.

2. Answer the questions on the separate answer sheet provided. Do NOT write your answers on the question paper.

3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 30 only.

4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the box for your choice with a pencil as shown below.



5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new box.

6. Do NOT write anything in the answer grid. The computer only records what is in the boxes.

7. You may use a simple calculator if you wish.

1. If E = {1, 2, 3, 4} and F = {4, 3, 2, 1}, then $E \cap F$ is equal to

   A. E only.
   B. F only.
   C. $E \cup F$ only.
   D. E, F and $E \cup F$.

2. For any three non-empty sets A, B and C which one of the following is **FALSE**?

   A. $A \cup (B \cup C) = (A \cup B) \cup C$
   B. $(A \cap B) \cap C = A \cap (B \cap C)$
   C. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
   D. $A \cap (B \cup C) = (A \cap B) \cup C$

3. By De Morgan's law $(A \cap B)^C$ is equal to

   A. $(A \cup B)^C$.
   B. $A^C \cup B^C$.
   C. $A^C \cap B^C$.
   D. $(A^C \cap B)$.

4. For A = {a, b}, the Cartesian product $A \times A$ is equal to

   A. $(\{a^2, ab), (ba, b^2)\}$.
   B. $\{(a^2, b^2)\}$.
   C. $\{(a, a), (a, b), (b, a), (b, b)\}$.
   D. $\{\{a, a\}, \{a, b\}, \{b, a\}, \{b, b\}\}$.

5. The conjugate of $-2-\sqrt{3}$ is

   A. $-2+\sqrt{3}$
   B. $\dfrac{1}{-2+\sqrt{3}}$
   C. $2+\sqrt{3}$
   D. $\dfrac{1}{2+\sqrt{3}}$

6. $(a^2b^3)^4 \div ab^2$ is equal to

   A. a^6b^9
   B. a^7b^{10}
   C. a^6b^{12}
   D. a^7b^{12}

7. $(1000)^{-\frac{1}{3}}$ is equal to

   A. -10

   B. 10

   C. $-\frac{1}{10}$

   D. $\frac{1}{10}$

8. On simplification $\sqrt{3}\left(\sqrt{3}+\sqrt{12}\right)$ is equal to

   A. $\sqrt{45}$

   B. $5\sqrt{2}$

   C. 9

   D. 45

9. The multiplicative inverse of $-\frac{3}{2}$

   A. is $\frac{3}{2}$

   B. is $\frac{2}{3}$

   C. is $-\frac{2}{3}$

   D. does not exist

10. In scientific notation 7200000 can be written as

    A. 7.2×10^{6}

    B. 7.2×10^{-6}

    C. 7.2×10^{5}

    D. 7.2×10^{-5}

11. If log 2 = 0.3010, then log 8 is equal to

    A. 0.6020

    B. 1.6020

    C. 0.9030

    D. 1.9030

12. If $\log_x 125 = 3$ then the value of x is

A. 2
B. 3
C. 4
D. 5

13. The degree of polynomial $x^4 + x^3y^2 + x^2y^3 + xy^4$ is

A. 2
B. 3
C. 4
D. 5

14. The value of polynomial $\frac{a^2}{a^2 - b^2}$ for $a = -1$ and $b = -2$ is

A. $\frac{1}{3}$
B. $\frac{1}{5}$
C. $-\frac{1}{5}$
D. $-\frac{1}{3}$

15. $(\sqrt{x} - \sqrt{y})(\sqrt{x} + \sqrt{y})$ is equal to

A. $x - 2\sqrt{xy} + y$.
B. $x - 2\sqrt{xy} - y$.
C. $x - y$.
D. $x + y$.

16. $\frac{x^2}{4} + 1$ can be made a perfect square by adding

A. $4x^2$.
B. $\frac{x}{2}$.
C. x.
D. $2x$.

17. The H.C.F of $x^2 - y^2$ and $x^2 + 2xy + y^2$ is

A. $x + y$.
B. $x - y$.
C. $x^2 - y^2$.
D. $(x + y)^2$.

18. The L.C.M of $x^2 - y^2$ and $x^2 + 2xy + y^2$ is

A. $x + y$.
B. $x - y$.
C. $(x - y)^2 (x + y)$.
D. $(x + y)^2 (x - y)$.

19. The factors of $x^2 - 12x + 35$ are

A. $(x + 5)$ and $(x - 7)$.
B. $(x - 5)$ and $(x + 7)$.
C. $(x - 5)$ and $(x - 7)$.
D. $(x + 5)$ and $(x + 7)$.

20. The two numbers whose sum is –13 and product is –30 are

A. –2 and 15.
B. –3 and 10.
C. 2 and –15.
D. 3 and –10.

21. For $|x - 3| - 3 = -3$ x is equal to

A. –3
B. 0
C. 3
D. 9

22. If x belongs to natural numbers and $3x < x + 6$, then the values of x are

A. 1, 2
B. 0, 1, 2
C. 1, 2, 3
D. 0, 1, 2, 3

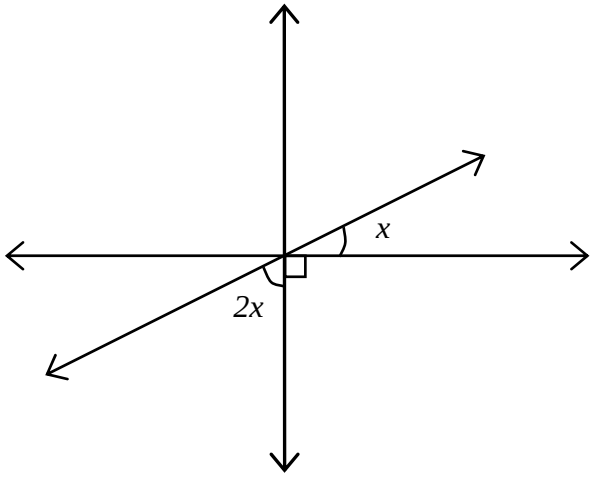
23. If $\sqrt{x + 2} = 2$, then the value of x is equal to

A. –2
B. 0
C. 2
D. ± 2

24. All of the following are the characteristics of two adjacent angles EXCEPT

A. They have a common vertex.
B. They have one arm common.
C. The intersection of their interior is a non-empty set.
D. The intersection of their interior is an empty set.

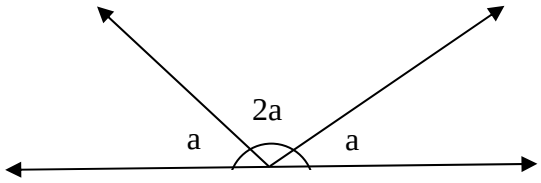
25. For the given figure the value of *x* is



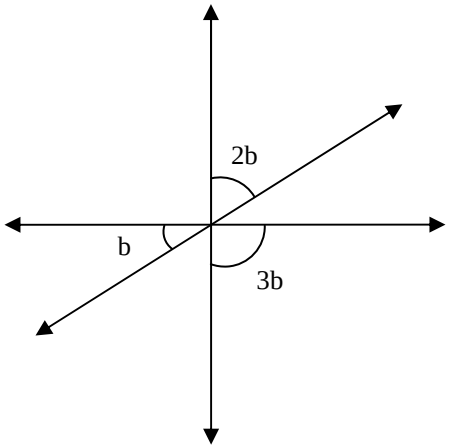
A. 10°
B. 20°
C. 30°
D. 40°

26. In the following figure the value of a is

A. 35°
B. 45°
C. 55°
D. 65°

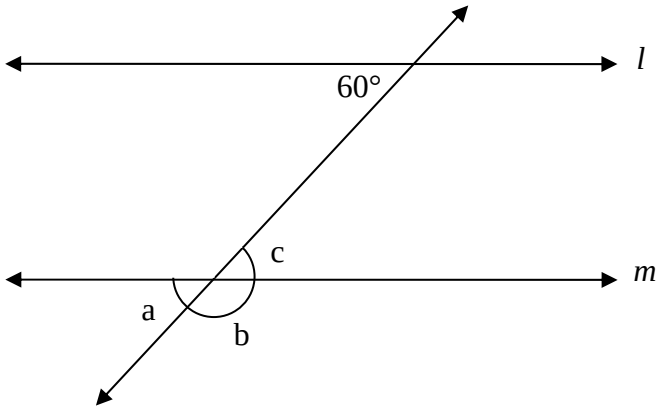


27. For the following figure the value of b is



A. 30°
B. 45°
C. 60°
D. 75°

28. In the given figure, if *l* and *m* are two parallel lines then the sum of a, b and c is equal to



A. 120°
B. 160°
C. 180°
D. 240°

29. All the altitudes of a triangle are equal in length if it is a/an

A. isosceles triangle.
B. obtuse angled triangle.
C. right angled triangle.
D. equilateral triangle.

30. Which of the following measurements would correspond to an isosceles triangle?

A. 5 cm, 5 cm, 10 cm.
B. 7 cm, 7 cm, 16 cm.
C. $\sqrt{5}$ cm, $\sqrt{5}$ cm, $3\sqrt{5}$ cm.
D. 8 cm, 8 cm, 10 cm.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION 2009

Mathematics Paper I

Time allowed: 40 minutes Marks 30

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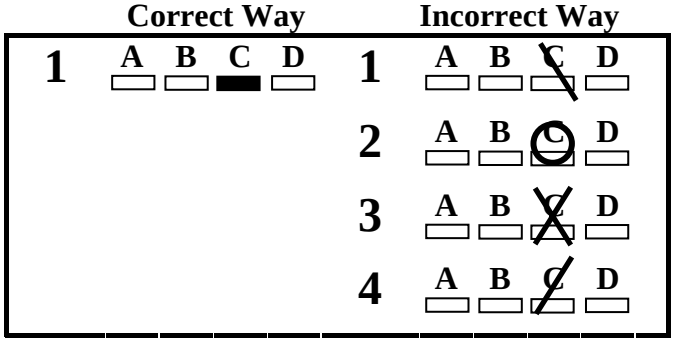

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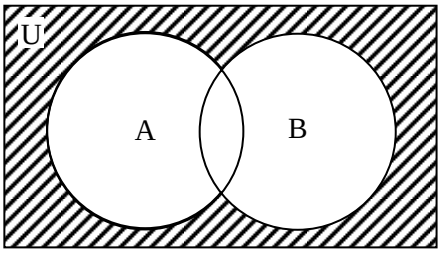
7. You may use a simple calculator if you wish.

1. If $(x-1, y+1) = (-1, 1)$, then (x, y) is

   A. $(-2, 2)$
   B. $(1, 1)$
   C. $(-1, -1)$
   D. $(0, 0)$

2. In the following Venn diagram, the shaded region is representing



   A. $(A \cup B)'$
   B. $(A \cap B)'$
   C. $A - B$
   D. $B - A$

3. If a function is defined as $f = \{(1, 2), (2, 2), (3, 2)\}$, then the range of function is

   A. $\{2\}$
   B. $\{1, 3\}$
   C. $\{2, 2, 2\}$
   D. $\{1, 2, 3\}$

4. If $S = \{1,2\}$, then the total number of binary relations in $S \times S$ is

   A. 2
   B. 4
   C. 8
   D. 16

5. $3\sqrt{3} - 6\sqrt{3}$ is equal to

   A. $3\sqrt{3}$
   B. $-3\sqrt{3}$
   C. $9\sqrt{3}$
   D. $-9\sqrt{3}$

6. $(\sqrt[3]{abc})^2$ is equal to

   A. $a^9 b^9 c^9$
   B. $a^6 b^6 c^6$
   C. $a^{\frac{3}{2}} b^{\frac{3}{2}} c^{\frac{3}{2}}$
   D. $a^{\frac{2}{3}} b^{\frac{2}{3}} c^{\frac{2}{3}}$

7. On simplification, $\left(\frac{1}{\sqrt{a}}\right)^4$ is equal to

   A. $\frac{1}{a}$
   B. $\frac{1}{a^2}$
   C. $a^{-\frac{1}{2}}$
   D. $-a^{\frac{1}{2}}$

8. $3^{\frac{1}{2}} \times 3^{-\frac{1}{2}}$ is equal to

   A. 0
   B. 1
   C. $3^{-\frac{1}{4}}$
   D. $9^{-\frac{1}{4}}$

9. $\sqrt{32}$ is equal to

   A. $4\sqrt{2}$
   B. $4\sqrt{8}$
   C. 16
   D. $16\sqrt{2}$

10. The characteristic of 0.00123 is

   A. –3
   B. –2
   C. 2
   D. 3

11. $\log_{10}\sqrt{10}$ is equal to

A. 0.1
B. 0.5
C. 1
D. 2

12. If $\log_{\sqrt{5}} 5 = x$, then the value of x is

A. 2
B. 3
C. 4
D. 5

13. If $P(x) = \sqrt{2}\ x - 1$, then the degree of polynomial *P(x)* is

A. 0
B. $\frac{1}{2}$
C. 1
D. $\sqrt{2}$

14. If the perimeter of a rectangular garden is $2(l + w) = 12$ and $w = 2$, then l is equal to

A. 8
B. 6
C. 4
D. 3

15. The value of expression $x^2 - y$ for $x = -2$ and $y = -1$ is

A. -5
B. -3
C. 3
D. 5

16. The Highest Common Factor (H.C.F) of $x^2 - y^2$ and $x + y$ is

A. $x + y$
B. $x - y$
C. $x^2 - y^2$
D. $(x - y)^2$

17. The Least Common Multiple (L.C.M) of x, x^2 and x^3 is

A. x
B. x^2
C. x^3
D. x^6

18. On simplifying $\frac{x + y}{x - y} - 1$, we get

A. $\frac{2y}{x - y}$
B. $\frac{2x}{x - y}$
C. $\frac{2x}{x + y}$
D. $\frac{2y}{x + y}$

19. On Simplifying $\frac{x^3 - y^3}{x^2 - y^2}$, we have

A. $x - y$
B. $x^2 + xy + y^2$
C. $\frac{x^2 - xy + y^2}{x - y}$
D. $\frac{x^2 + xy + y^2}{x + y}$

20. The square root of $x^2 - 6x + 9$ is equal to

A. $(x - 2)$
B. $(x - 3)$
C. $\pm(x - 2)$
D. $\pm(x - 3)$

21. If half of a number decreased by 2 is equal to –2, then mathematically it is expressed as

A. $2x + 2 = -2$
B. $2x - 2 = -2$
C. $\frac{x}{2} + 2 = -2$
D. $\frac{x}{2} - 2 = -2$

22. If the sum of two consecutive odd numbers is 28, then the smaller number is

A. 9
B. 11
C. 13
D. 15

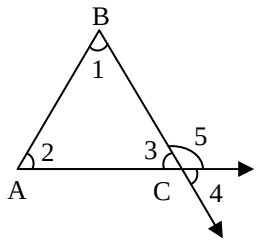
23. The value of x for $\frac{1}{x} - 3 = 2$ is

A. -5
B. $-\frac{1}{5}$
C. $\frac{1}{5}$
D. 5

24. If $|x| - 1 = 0$, then the solution set is

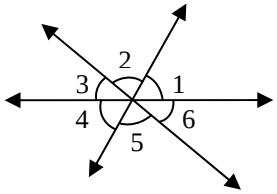
A. $\{-1\}$
B. $\{0\}$
C. $\{1\}$
D. $\{\pm 1\}$

25. In the given figure, $\angle 4$ is vertical angle of



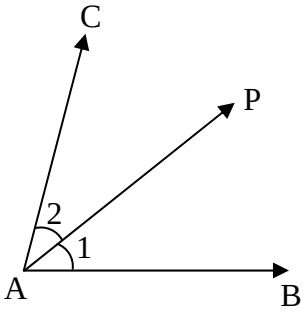
A. $\angle 1$
B. $\angle 2$
C. $\angle 3$
D. $\angle 5$

26. In the given figure which one of the following is a pair of adjacent angles?



A. $\angle 1$ and $\angle 2$
B. $\angle 1$ and $\angle 4$
C. $\angle 2$ and $\angle 4$
D. $\angle 2$ and $\angle 6$

27. In the given figure if AP is the angle bisector of $\angle BAC$, then which of the following statements are true?



I. $m\angle 1 = m\angle 2$
II. $m\angle 1 + m\angle 2 = m\angle BAC$
III. $m\angle 1 = 2m\angle BAC$

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

28. The point of concurrency of angle bisectors of a triangle is called the

A. centroid
B. circum-center
C. in-center
D. escribed center

29. Which one of the following is **NOT** the sides of a triangle

A. 5cm, 5cm, 5cm
B. 6cm, 7cm, 8cm
C. 3cm, 4cm, 5cm
D. 4cm, 4cm, 8cm

30. If a triangle has a pair of complementary angles, then the third angle is a/an

A. acute angle
B. obtuse angle
C. right angle
D. reflex angle

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

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CLASS IX EXAMINATION 2010

Mathematics Paper I

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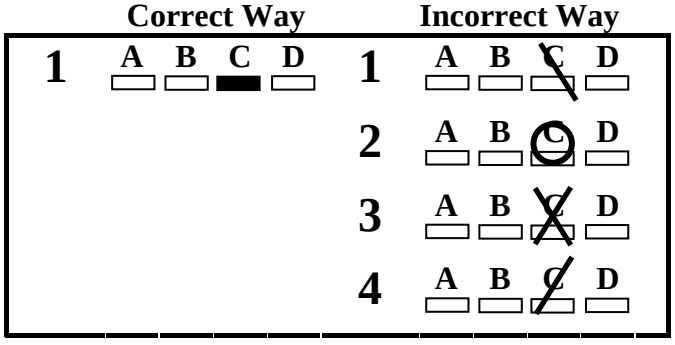

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7. You may use a simple calculator if you wish.

1. If $P = \{0, 2\}$ and $Q = \{0, 1\}$, then one of the ordered pairs of $P \times Q$ is

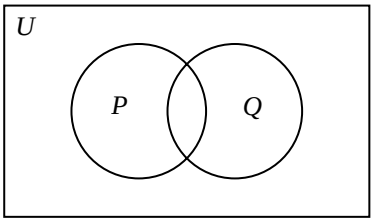
   A. (0,2)
   B. (1,0)
   C. (1,2)
   D. (0,1)

2. For two sets $A = \{0,1\}$ and $B = \{1,2\}$, which one of the following is a function from A to B ?

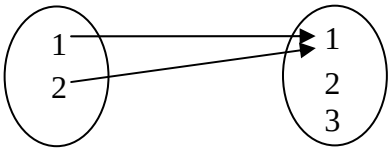
   A. $\{(1,1)\}$
   B. $\{(0,2),(1,2)\}$
   C. $\{(0,1),(0,2),(1,2)\}$
   D. $\{(0,1),(0,2),(1,1),(1,2)\}$

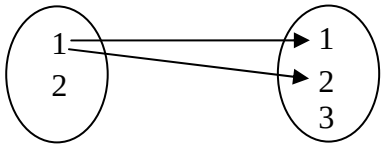
3. Consider the following Venn diagram. $P \cup (Q \cap P)$ is equal to

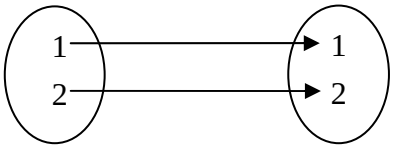
   A. P
   B. Q
   C. $P - Q$
   D. $Q - P$

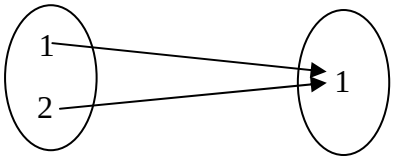


4. Which one of the following figures represents an injective function?

A.


B.


C.


D.


5. If $i = \sqrt{-1}$, then i^3 is equal to

   A. -1
   B. 1
   C. $-i$
   D. i

6. In decimal fractions, $\sqrt{8}$ is a fraction which is

   A. terminating and recurring
   B. non-terminating and recurring
   C. terminating and non-recurring
   D. non-terminating and non-recurring

7. $\left(\frac{a^{-1}}{a}\right)^2$ is equal to

   A. 1
   B. a^4
   C. $\frac{1}{a^2}$
   D. $\frac{1}{a^4}$

8. The conjugate of $-2-3i$ is equal to

   A. $2+3i$
   B. $-2+3i$
   C. $2-3i$
   D. $-2-3i$

9. If $\log 8 = x$, then the value of $\log 2$ is

   A. x^3
   B. 3
   C. $3x$
   D. $\frac{x}{3}$

10. Which one of the following is a polynomial?

    A. $\sqrt{2}y^2 - \frac{1}{2}$
    B. $y - \frac{1}{y}$
    C. $\sqrt{y} + 2$
    D. $\sqrt{y^2 - 2}$

11. $(a-b+c)^2$ is equal to

    A. $a^2 + b^2 + c^2$
    B. $a^2 - b^2 + c^2$
    C. $a^2 + b^2 + c^2 + 2ab + 2bc - 2ca$
    D. $a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$

12. If $P = \frac{1}{\sqrt{3}-\sqrt{2}}$, then $\frac{1}{P}$ is equal to

A. $\sqrt{3}+\sqrt{2}$
B. $-\sqrt{3}-\sqrt{2}$
C. $\sqrt{2}-\sqrt{3}$
D. $\sqrt{3}-\sqrt{2}$

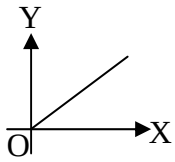
13. If remainder of $\left(x^2+2x-1\right)\div\left(x-1\right)$ is 2, then which one of the following is exactly divisible by $x-1$?

A. x^2+2x+2
B. x^2+2x-1
C. x^2+2x+1
D. x^2+2x-3

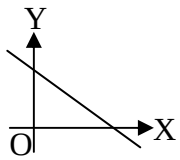
14. On factorization of $c^2-\left(d+2\right)^2$, we get

A. $\left(c+d+2\right)\left(c-d-2\right)$
B. $\left(c+d+2\right)\left(c-d+2\right)$
C. $\left(c-d+2\right)\left(c-d-2\right)$
D. $\left(c+d-2\right)\left(c-d-2\right)$

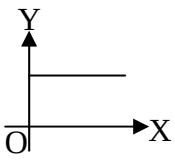
15. Which of the following graph shows a direct relation between x and y ?



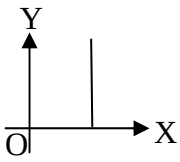
A.



B.



C.



D.

16. Which one of the following are inversely proportional to each other?

A. Side and area of a square
B. Age and weight of student
C. Radius and circumference of a circle
D. Number of days and number of workers for a task

17. For $x : y :: y : z$, z is known as

A. second proportional
B. third proportional
C. fourth proportional
D. mean proportional

18. If $\begin{bmatrix} 4 & -4 \\ 8 & 12 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 0 & 3 \end{bmatrix} + 3\begin{bmatrix} a & d \\ c & d \end{bmatrix}$, then the value of c is

A. -8
B. $-\frac{8}{3}$
C. $\frac{8}{3}$
D. 8

19. If $P = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ and $X = P \times Q$, then X is equal to

A. P
B. Q
C. QP
D. $Q^{-1}P$

20. For any three matrices A, B and C, $A \times (B \times C)$ is equal to

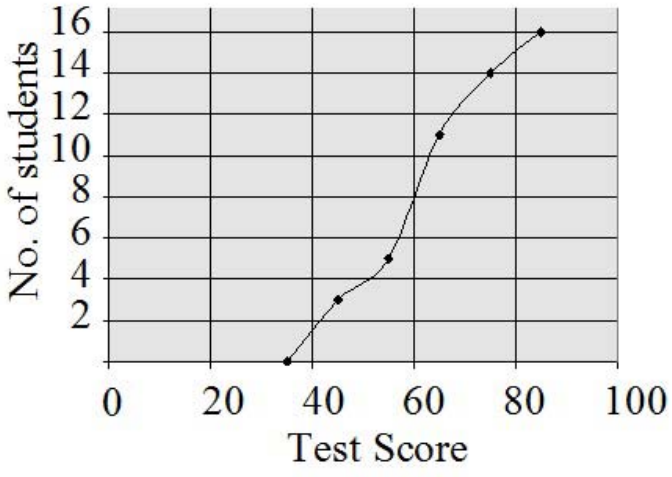
A. $(A \times B) \times C$
B. $(B \times C) \times A$
C. $A \times (C \times B)$
D. $(B \times A) \times C$

21. The median of four numbers is 6.5. If three of the numbers are 3, 5 and 9, then the 4^{th} number is

A. 3
B. 4
C. 8
D. 10

22. In the following cumulative frequency curve, the test scores of 16 students are shown. The median test score is

A. 8
B. 50
C. 60
D. 65



23. The harmonic mean for 2, 3, 5, 9 is

A. $\dfrac{4}{2+3+5+9}$

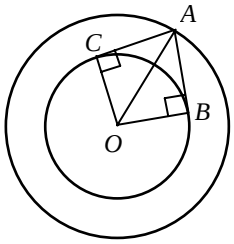
B. $\dfrac{1}{2}+\dfrac{1}{3}+\dfrac{1}{5}+\dfrac{1}{9}$

C. $\sqrt{\dfrac{2+3+5+9}{4}}$

D. $\dfrac{4}{\dfrac{1}{2}+\dfrac{1}{3}+\dfrac{1}{5}+\dfrac{1}{9}}$

24. The centre of both the circles given below is *O*. If *AB* and *AC* are tangents to the inner circle and $m\angle AOB = 20°$, then $m\angle OAC$ is equal to

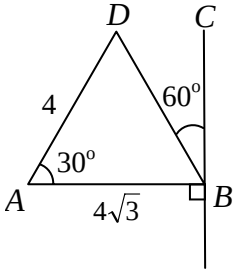
A. 20°
B. 70°
C. 90°
D. 110°



NOT TO SCALE

25. In the following figure $\overline{AB}$ is perpendicular to $\overline{BC}$. The length of $\overline{BD}$ is

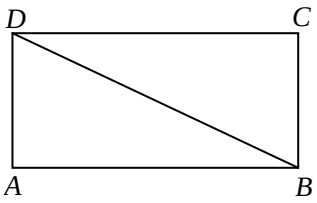
A. 2
B. $2\sqrt{3}$
C. 4
D. $4\sqrt{3}$



NOT TO SCALE

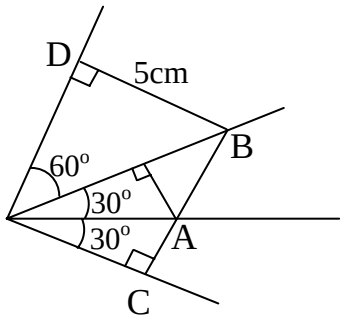
26. In the following figure ΔABD is congruent to ΔCDB. The corresponding angle of $\angle ADB$ is

A. $\angle ADB$
B. $\angle ABC$
C. $\angle CBD$
D. $\angle BDC$



27. In the following figure if AC = 2cm and BD = 5cm, then the length of AB is

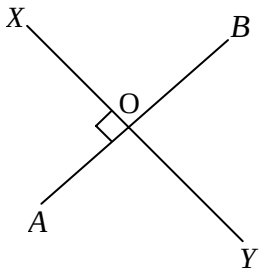
A. 2cm
B. 3cm
C. 4cm
D. 5cm



NOT TO SCALE

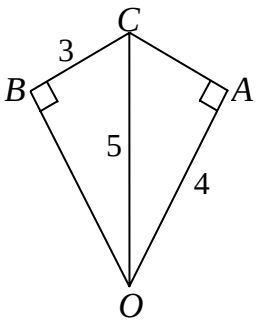
28. $\overline{XY}$ is the right bisector of $\overline{AB}$. If $m\overline{AB} = a$, then $m\overline{OA}$ is

A. $\frac{a}{2}$
B. a
C. $2a$
D. a^2



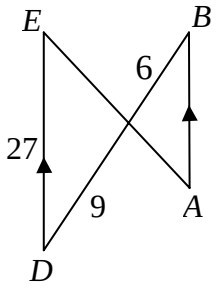
29. In the given figure if $\overline{OC}$ is the angle bisector of $\angle AOB$, then $m\overline{AC} + m\overline{BC}$ is equal to

A. 6
B. 7
C. 8
D. 9



30. In the following figure if $\overline{AB}$ is parallel to $\overline{DE}$, then the length of $\overline{AB}$ is

A. 6
B. 9
C. 15
D. 18



END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2011

Mathematics Paper I

Time allowed: 40 minutes Marks 30

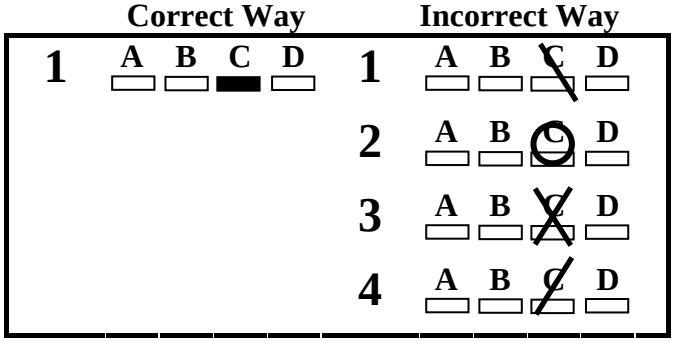
INSTRUCTIONS

1. Read each question carefully.

2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.

3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 30 only.

4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the box for your choice with a pencil as shown below.



5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new box.

6. DO NOT write anything in the answer grid. The computer only records what is in the boxes.

7. You may use a simple calculator if you wish.

1. A set of integers is closed under

   I addition.
   II division.
   III multiplication.

   A. II only
   B. I and II only
   C. II and III only
   D. I and III only

2. The expression $\sqrt[5]{x^5 y^5}$ is equal to

   A. $x^{25} y^{25}$
   B. $x^{10} y^{10}$
   C. $x^5 y^5$
   D. xy

3. $\left(\sqrt{4}\right)^0$ is equal to

   A. 0
   B. 1
   C. 2
   D. 4

4. The real part of complex number $5i$ is

   A. -5
   B. 0
   C. 1
   D. 5

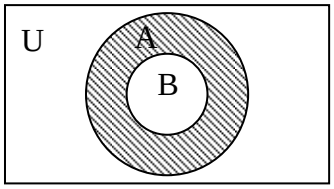
5. If $A = \{0,-1,-2\}$ and $B = \{0,1,2\}$, then $A \cap B$ is

   A. $\{\ \}$
   B. $\{\phi\}$
   C. $\{0\}$
   D. $\{0,1,2\}$

6. For any three sets *A*, *B* and *C*, $A \cap (B \cup C)$ is equal to

A. $A \cup (B \cap C)$
B. $A \cap (B \cap C)$
C. $(A \cup B) \cap (A \cup C)$
D. $(A \cap B) \cup (A \cap C)$

7. The shaded area in the given Venn diagram represents



A. $A \cup B$
B. $A \cap B$
C. $B - A$
D. $A - B$

8. If $r = \{(1, a), (2, b)\}$ is a binary relation, then domain of *r* is

A. $\{(1,2)\}$
B. $\{1,2\}$
C. $\{(a,b)\}$
D. $\{a,b\}$

9. The radius of the moon is 1738140m (approx). In scientific notation it is equal to

A. 1.73814×10^4 m.
B. 1.73814×10^5 m.
C. 1.73814×10^6 m.
D. 1.73814×10^7 m.

10. Simplified form of $\frac{a^2 - 2ab + b^2}{(a-b)(a+b)}$ is

A. $\frac{1}{a-b}$
B. $\frac{1}{a+b}$
C. $\frac{a-b}{a+b}$
D. $\frac{a+b}{a-b}$

11. The value of algebraic expression $\frac{a}{a^2+1}$ for $a=-1$ is

A. $-\frac{1}{2}$
B. 0
C. $\frac{1}{2}$
D. 1

12. If $a+b=1$ and $a-b=1$, then the value of ab is

A. 0
B. $\frac{1}{4}$
C. 1
D. 2

13. Factorized form of $-6x^2-10x$ is

A. $2x(3x-5)$
B. $-2x(3x-5)$
C. $-2x(3x+5)$
D. $2x(3x+5)$

14. The remainder of $(x+1)\div(x-1)$ is

A. -1
B. 0
C. 1
D. 2

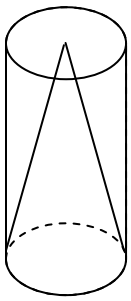
15. The fourth proportional of $\frac{1}{2}, \frac{3}{2}$ and $\frac{2}{3}$

A. $\frac{2}{9}$
B. $\frac{4}{9}$
C. $\frac{1}{2}$
D. 2

16. Twelve workers were hired to bind 1000 books in four days. Before starting the work, four more workers were hired to help complete the task. The estimated time for completion of the task is

A. two days.
B. three days.
C. four days.
D. six days.

17. For equal radii, the ratio of volumes of a cone and a cylinder is 1: 3. If volume of the cylinder is $6cm^3$, then the volume of cone of same radius is



A. $2\,cm^3$.
B. $9\,cm^3$.
C. $18\,cm^3$.
D. $27\ cm^3$.

18. The matrix $\begin{bmatrix}1 & 1 & -1\end{bmatrix}$ is a

A. column matrix.
B. scalar matrix.
C. row matrix.
D. unit matrix.

19. The additive identity of every 2×2 matrix is

A. $\begin{bmatrix}1 & 0\\ 1 & 0\end{bmatrix}$
B. $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$
C. $\begin{bmatrix}0 & 0\\ 0 & 0\end{bmatrix}$
D. $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

20. Which one of the following is a skew-symmetric matrix?

A. $\begin{bmatrix}0 & 2\\ 2 & 0\end{bmatrix}$
B. $\begin{bmatrix}0 & 2\\ -2 & 0\end{bmatrix}$
C. $\begin{bmatrix}2 & 0\\ 0 & 2\end{bmatrix}$
D. $\begin{bmatrix}2 & 2\\ 0 & 0\end{bmatrix}$

21. The ages (in years) of 9 children in a group are 7, 7, 8, 9, 6, 8, 5, 8 and 10. The modal age is

A. 6
B. 7
C. 8
D. 9

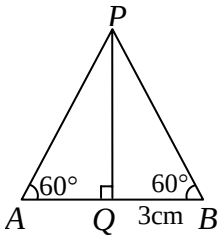
22. The marks obtained by 8 students in a class are 40, 60, 55, 65, 73, 85, 68 and 70. The range of the marks is

A. 85
B. 73
C. 65
D. 45

23. Ahmed arranged the number of books owned by his friends in ascending order as 10, 12, 15, x, 17, 18. If the median of the data is 16, then the value of x is

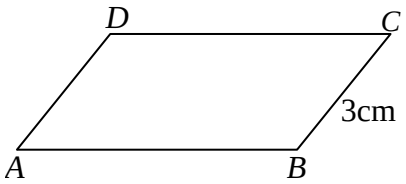
A. 15
B. 15.5
C. 16
D. 17

24. In the given diagram $m\overline{AB}$ is



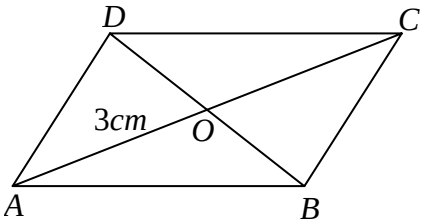
A. $3cm$.
B. $4cm$.
C. $6cm$.
D. $7cm$.

25. If the perimeter of the given parallelogram is $16cm$ and $m\overline{BC} = 3cm$, then $m\overline{AB}$ is



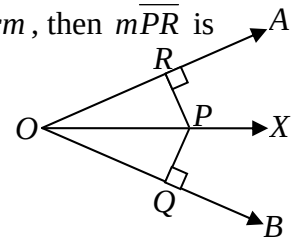
A. $3cm$.
B. $4cm$.
C. $5cm$.
D. $6cm$.

26. In the given parallelogram $m\overline{AO} = 3cm$. $m\overline{CO}$ is



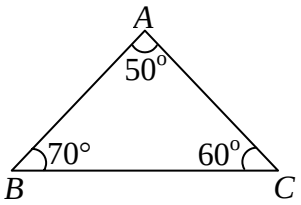
A. $3cm$.
B. $6cm$.
C. $9cm$.
D. $12cm$.

27. In the given figure, $\overrightarrow{OX}$ is angle bisector of $\angle AOB$. If $m\overline{PQ} = 3cm$, then $m\overline{PR}$ is



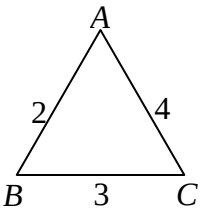
A. $2cm.$
B. $3cm.$
C. $4cm.$
D. $6cm.$

28. For the given triangle ΔABC, which one of the following statements is true?



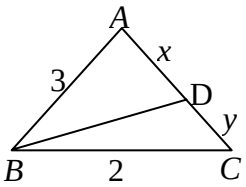
A. $m\overline{AC} > m\overline{BC}$
B. $m\overline{AB} > m\overline{AC}$
C. $m\overline{BC} > m\overline{AB}$
D. $m\overline{BC} > m\overline{AC}$

29. For the given ΔABC, which one of the following is true?



A. $m\angle C < m\angle A < m\angle B$
B. $m\angle B < m\angle A < m\angle C$
C. $m\angle A < m\angle B < m\angle C$
D. $m\angle C < m\angle B < m\angle A$

30. If $\overline{BD}$ is the internal bisector of $\angle ABC$, then the ratio of $x : y$ is



A. 1 : 2
B. 3 : 1
C. 2 : 3
D. 3 : 2

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2012

Mathematics Paper I

Time allowed: 40 minutes Marks 30

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
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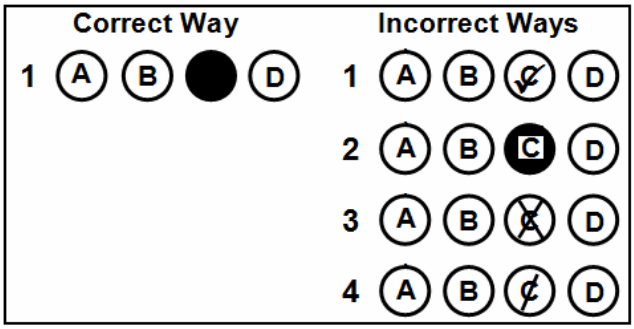
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. If $a + b = 0 = b + a$, then b is called

   A. additive inverse of a.
   B. multiplicative inverse of a.
   C. additive identity.
   D. multiplicative identity.

2. In the following numbers the irrational number is

   A. $\frac{3}{2}$
   B. $\sqrt{\frac{3}{2}}$
   C. $\sqrt{\frac{16}{9}}$
   D. 3.125

3. $3^{\frac{1}{2}} \times 3^{-\frac{1}{2}}$ is equal to

   A. 0
   B. 1
   C. $9^{-\frac{1}{4}}$
   D. $3^{-\frac{1}{4}}$

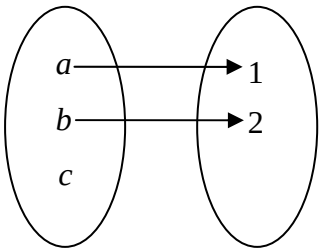
4. $(3 + 2i) \times i$ is equal to

   A. $-2 + 3i$
   B. $3 - 2i$
   C. $2 - 3i$
   D. $-3 + 2i$

5. If $A = \{a , b\}$ and $B = \{c , d\}$, then $A - B$ is equal to

   A. $\{\ \}$
   B. $\{c , d\}$
   C. $\{a , b\}$
   D. $\{a - c , b - d\}$

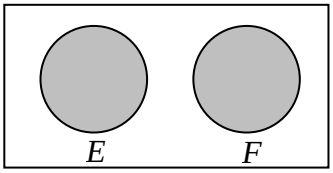
6. The given diagram represents



I. a one – one function.
II. a one – one correspondence.
III. an onto function.

A. II only
B. III only
C. I and II only
D. I and III only

7. In the given Venn diagram the shaded portion represents



A. $E \cap F$
B. $E \cup F$
C. $E^C \cup F^C$
D. $E^C \cap F^C$

8. If $A = \{a , b\}$ and $B = \{2 , 3\}$, then one relation from A to B is

A. $\{(a , b) , (2 , 3)\}$
B. $\{(a , 3) , (2 , b)\}$
C. $\{(a , 2) , (a , 3)\}$
D. $\{(2 , a) , (3 , b)\}$

9. The characteristic of log 0.001 is

A. 3
B. 2
C. – 2
D. – 3

10. $\dfrac{2a^4}{3(b + 1)^2} \times 6(b + 1)^2$ is equal to

A. $2a^4$
B. $4a^4$
C. $4a^2(b + 1)^2$
D. $2a^4(b + 1)^2$

11. If $(a + b)^2 = 16$ and $4ab = 12$, then $(a - b)^2$ is equal to

A. 4
B. 8
C. ± 4
D. ± 8

12. $(x + y)^3$ is equal to

A. $x^3 + y^3$
B. $x^3 + y^3 - 3xy(x + y)$
C. $x^3 + y^3 + 3xy(x - y)$
D. $x^3 + y^3 + 3xy(x + y)$

13. On factorization of $2x + 2y - (x + y)$, we get

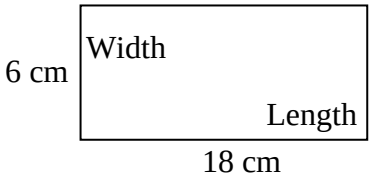
A. $-(x + y)$
B. $-(x - y)$
C. $(x + y)$
D. $(x - y)$

14. On factorization of $4b^2 - 1$, we get

A. $4(b - 1)(b + 1)$
B. $4(b - 1)(b - 1)$
C. $4\left(b - \frac{1}{2}\right)\left(b + \frac{1}{2}\right)$
D. $4\left(b - \frac{1}{2}\right)\left(b - \frac{1}{2}\right)$

15. The length and width of a rectangle are shown in the figure. The ratio of width to length is

A. 1 : 4
B. 1 : 3
C. 3 : 1
D. 4 : 1



16. For $4 : b :: b : 25$, the mean proportion b is equal to

A. $\pm \frac{5}{2}$
B. $\frac{5}{2}$
C. 10
D. ± 10

17. If $y = \frac{k}{x}$, then by using the following table the value of k is

x	3	2
y	6	9

A. $\frac{1}{2}$
B. $\frac{9}{2}$
C. 2
D. 18

18. Order of matrix $A = \begin{bmatrix} 2 & 1 & 3-a \\ 0 & 0 & 3-b \end{bmatrix}$ is

A. 2×3
B. 3×2
C. 2×4
D. 4×2

19. $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$ is a

A. diagonal matrix.
B. rectangular matrix.
C. scalar matrix.
D. unit matrix.

20. If $A = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \end{bmatrix}$, then AB is

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
B. $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$
C. $\begin{bmatrix} 1 & 0 \end{bmatrix}$
D. $\begin{bmatrix} 0 & 1 \end{bmatrix}$

21. The following table shows the number of ice-creams sold in a certain week of May at a shop.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
110	120	110	130	80	200	220

The median of the given table is

A. 110
B. 120
C. 130
D. 220

22. Sana draws 10 cards from a bag. The cards are numbered from 0 to 4.
The data are recorded as follows:

Score	Number of Cards
0	4
1	1
2	2
3	1
4	2

The average score of 10 cards is

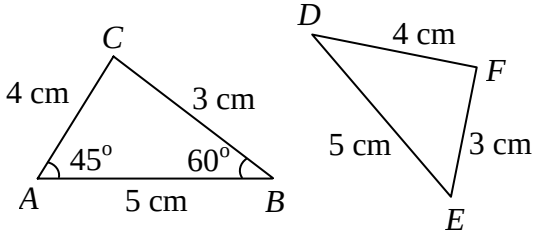
A. 1
B. 2
C. 1.6
D. 2.7

23. Which of the following graphical methods is the most appropriate to estimate mode?

A. Histogram
B. Frequency polygon
C. Pie chart
D. Cumulative frequency polygon

24. For the given triangles, $m \angle F$ is equal to

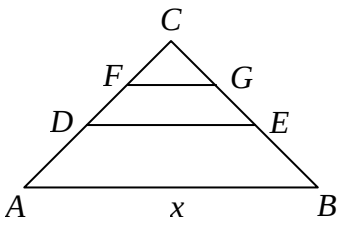
A. 45°
B. 60°
C. 65°
D. 75°



NOT TO SCALE

25. If *D*, *E*, *F* and *G* are the mid points of *AC*, *BC*, *DC* and *EC* respectively, then *m FG* is equal to

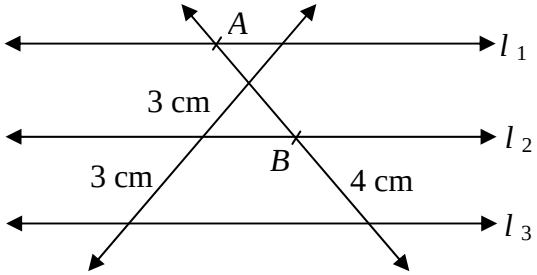
A. $4x$
B. $2x$
C. $\frac{x}{2}$
D. $\frac{x}{4}$



NOT TO SCALE

26. If l_1 , l_2 and l_3 are three parallel lines, then in the given figure $m\,AB$ is equal to

A. 7 cm
B. 4 cm
C. 3 cm
D. 2 cm

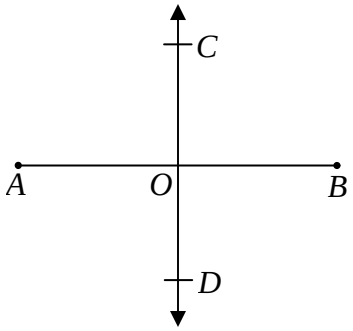


NOT TO SCALE

27. In the given figure if *CD* is the right bisector of line segment *AB*, then which of the following conditions is/are TRUE?

I. $AB \perp CD$
II. $AO \cong OB$
III. $AC \cong AO$

A. I and III only
B. I and II only
C. II only
D. I only



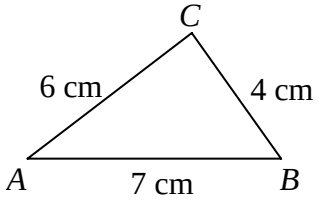
NOT TO SCALE

28. The point of concurrency of angle bisectors of a triangle is called

A. centroid.
B. circum centre.
C. inscribed centre.
D. circum circle.

29. In the given triangle *ABC*, which of the following conditions is TRUE?

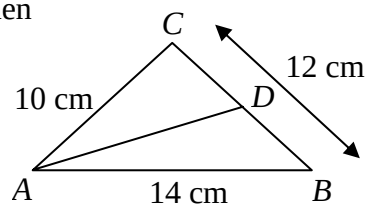
A. $m\angle A > m\angle B$
B. $m\angle B > m\angle C$
C. $m\angle A > m\angle C$
D. $m\angle C > m\angle B$



NOT TO SCALE

30. If *AD* is the angle bisector of ΔBAC , then

A. $CD : BD = 5 : 7$
B. $CD : BD = 7 : 5$
C. $CD : BD = 5 : 6$
D. $CD : BD = 7 : 6$



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END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

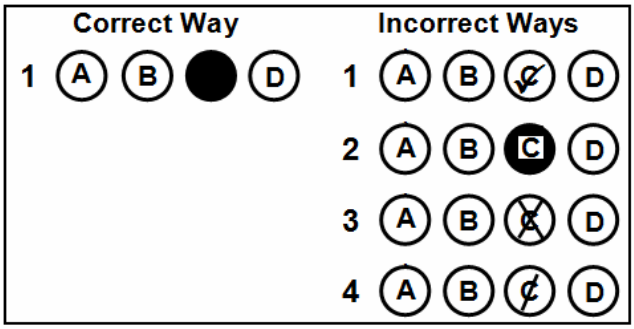
MAY 2013

Mathematics Paper I

Time: 40 minutes Marks: 30

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 30 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. Which of the following fractions is a terminating decimal fraction?

   A. $\frac{4}{3}$
   B. $\frac{3}{4}$
   C. $\sqrt{3}$
   D. $\frac{1}{\sqrt{3}}$

2. If a is the multiplicative inverse of b, then

   A. $\frac{1}{a} = -b$
   B. $a = -b$
   C. $ab = 0$
   D. $ab = 1$

3. $\frac{2^n}{2^{n+1} - 2^n}$ is equal to

   A. $\frac{1}{2^n - 1}$
   B. $\frac{1}{2}$
   C. 1
   D. -1

4. If $z = \sqrt{-1-i}$, then the conjugate of z^2 is

   A. $\sqrt{-1+i}$
   B. $\sqrt{1+i}$
   C. $-1+i$
   D. $1+i$

5. If $K = \{2,3\}, L = \{2,3\}$ and $K \cap M = L$, then which of following options is true for set M?

   I. $\{2,3\}$
   II. $\{1,3,5\}$
   III. $\{1,2,3,6\}$

   A. I only
   B. II only
   C. I and III only
   D. II and III only

6. If $E \cup F = \{a, b, c, d, e\}$ and $E \cap F = \{b, d, e\}$, then $E \Delta F$ is equal to

   A. $\{e\}$
   B. $\{a, c\}$
   C. $\{b, d\}$
   D. $\{a, b, c, d, e\}$

7. For set *E*, which of the following conditions is FALSE?

   A. $E \cup E = E$
   B. $E \cap E = E$
   C. $E \cup \phi = E$
   D. $E \cap \phi = E$

8. Which of the following statements is TRUE?

   A. Every relation is a function.
   B. Every function is a one-one correspondence.
   C. A one-one correspondence is a bijective function.
   D. An onto and a one-one function is a surjective function.

9. $\log_a y = x$ is possible only when

   I. $a > 0$ and $y > 0$
   II. $a \neq 1$
   III. $y < 0$

   A. I only
   B. III only
   C. I and II only
   D. I and III only

10. If $\log_{1+a} a^2 = 1$, then

    A. $a^2 = 1$
    B. $a^2 = 2 + 2a$
    C. $a^2 = 1 + a$
    D. $a^2 = 1 - a$

11. The value of an algebraic expression $\sqrt{2}x - 1$, when $x = \frac{1}{\sqrt{2}}$, is

    A. 0
    B. 1
    C. $\sqrt{2}$
    D. $2\sqrt{2}$

12. If $(m+n)^2 - (m-n)^2 = 16$, then mn is equal to

A. 2
B. 4
C. $2\sqrt{2}$
D. $4\sqrt{2}$

13. If $ab = \frac{1}{2}$, then $(a-b)^2$ is equal to

A. $a^2 - b^2$
B. $a^2 + b^2$
C. $a^2 + 1 - b^2$
D. $a^2 - 1 + b^2$

14. On factorization of $1 - 2a + a^2 - b^2$, we get

A. $(1-a-b)(1-a+b)$
B. $(1-a-b)(1+a+b)$
C. $(1+a-b)(1+a+b)$
D. $(1+a-b)(1-a+b)$

15. The polynomial $x^3 - 2x^2 + 1$ is divisible by

A. x
B. $x-1$
C. $x+1$
D. $x+2$

16. The zero of a polynomial $3x + \frac{1}{3}$ is

A. -1
B. $-\frac{1}{9}$
C. $\frac{1}{9}$
D. 1

17. If y varies directly as $\sqrt{x-3}$ and $y = 18$ for $x = 7$, then constant of proportionality is equal to

A. 9
B. $\frac{1}{9}$
C. $-\frac{1}{9}$
D. -9

18. The mean proportional is equal to the

A. square of the product of means.
B. square of the product of extremes.
C. square root of the product of means.
D. square root of the product of extremes.

19. Which of the following matrices are square matrices?

I. $\begin{bmatrix} 1 \end{bmatrix}$
II. $\begin{bmatrix} 1 & a \end{bmatrix}$
III. $\begin{bmatrix} a-7 & 2 \\ 0 & 0 \end{bmatrix}$

A. I only
B. III only
C. II and III only
D. I and III only

20. If the determinant of the matrix $\begin{bmatrix} -1 & 1 \\ -7 & 5 \end{bmatrix}$ is 2, then the determinant of its additive inverse is

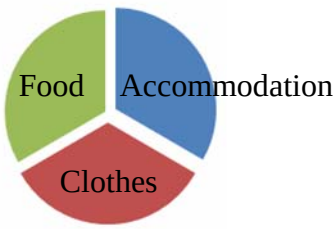
A. -2
B. 2
C. $\frac{1}{2}$
D. $-\frac{1}{2}$

21. If $\begin{bmatrix} 3 & K \\ 1 & 0 \end{bmatrix}$ is a non-singular matrix, then

A. $K \neq 0$
B. $K \neq 1$
C. $K \neq 3$
D. $K \neq -3$

22. In the given pie chart if all the three sections are cut equally, then the angle of each section is

A. 60^o
B. 90^o
C. 120^o
D. 360^o



23. If $Y = \frac{a}{2}X + b$, $\overline{X} = 2$ and a and b are constants, then $\overline{Y}$ is equal to

[**Note:** $\overline{X}$ and $\overline{Y}$ are the arithmetic means of X and Y respectively]

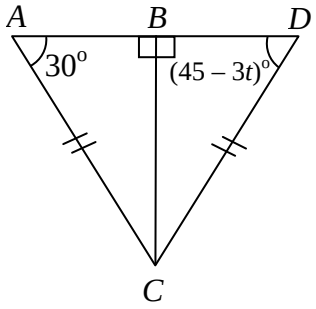
A. $\frac{a}{2} + b$
B. $a + b$
C. $\frac{a+b}{2}$
D. $a + \frac{b}{2}$

24. In order to find the mode of the data we need to identify the

A. minimum value.
B. maximum value.
C. least repeated value.
D. most repeated value.

25. If $\Delta ABC \cong \Delta DBC$, then the value of t is equal to

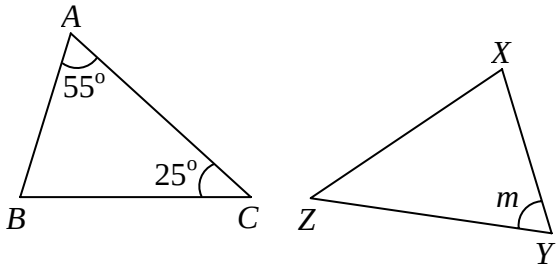
A. 5
B. 12
C. 18
D. 25



NOT TO SCALE

26. In correspondence $\Delta ABC \longleftrightarrow \Delta XYZ$, if two triangles are congruent, then the value of m is equal to

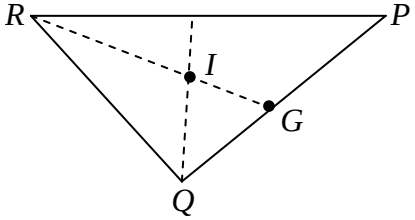
A. 25^o
B. 55^o
C. 80^o
D. 100^o



NOT TO SCALE

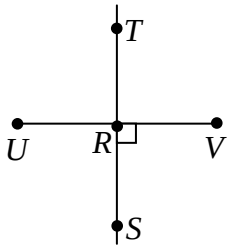
27. If I is the point of concurrency of medians of the triangle PQR, then which of the following conditions must be true?

A. $RI = IG$
B. $IG = 3RI$
C. $IG = \frac{1}{2}RI$
D. $IG = 2RI$



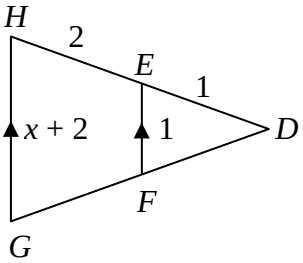
NOT TO SCALE

28. In the given diagram if TS is the right bisector of $\overline{UV}$, then which of the following conditions is TRUE?



A. $TU = TV$
B. $TU = RV$
C. $US = RT$
D. $TS = UV$

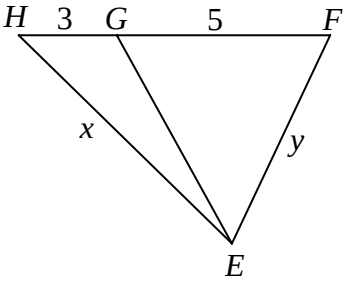
29. In the given diagram the value of x is equal to



NOT TO SCALE

A. 1
B. 2
C. 3
D. 4

30. If EG is the angle bisector of $\angle FEH$, then which of the following conditions is TRUE?



NOT TO SCALE

A. $\frac{x}{y} = \frac{3}{5}$
B. $\frac{x}{5} = \frac{y}{3}$
C. $\frac{x}{y} = \frac{8}{3}$
D. $\frac{x}{y} = \frac{3}{8}$

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2014

Mathematics Paper I

Time: 40 minutes Marks: 30

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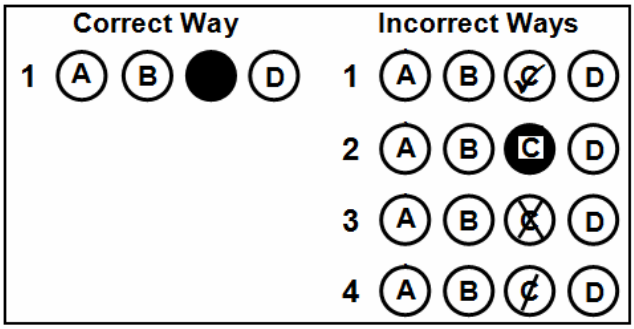

Candidate's Signature

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6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. $3-i-(2-i)$ is equal to **Note**: $i=\sqrt{-1}$

   A. 1
   B. $1+2i$
   C. -1
   D. $-1-2i$

2. The expression $\sqrt[5]{x^5y^5}$ is equal to

   A. $x^{25}y^{25}$
   B. $x^{10}y^{10}$
   C. x^5y^5
   D. xy

3. If $a+b=0=b+a$, then a is said to be the

   A. additive identity of *b*.
   B. additive inverse of *b*.
   C. multiplicative identity of *b*.
   D. multiplicative inverse of *b*.

4. $(2y)^3$ is equal to

   A. $2y^3$
   B. $6y^3$
   C. $6y$
   D. $8y^3$

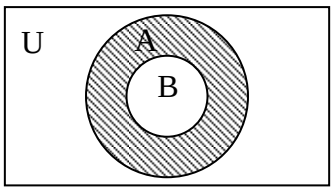
5. If $N=\{1,2,3,4,5,.....\}$ and $R=\{.....,-3,-2,-1,0,1,2,3,.....\}$, then $N\cap R$ is equal to

   A. $\{1,2,3,4,5,.....\}$
   B. $\{1,2,3\}$
   C. $\{0,1,2,3,.....\}$
   D. $\{.....,-3,-2,-1,0,1,2,3,.....\}$

6. For $X=\{1,2,3\}$ and $Y=\{4,5,6\}$, $X-Y$ is equal to

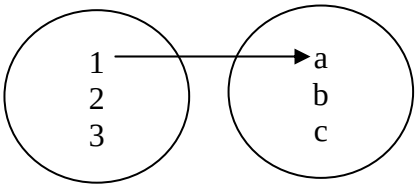
   A. $\{\ \}$
   B. $\{1,2,3\}$
   C. $\{4,5,6\}$
   D. $\{1,2,3,4,5,6\}$

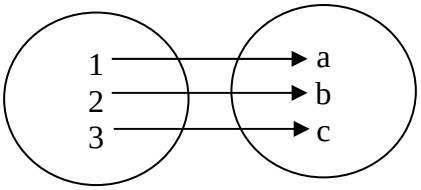
7. The shaded area in the given Venn diagram represents

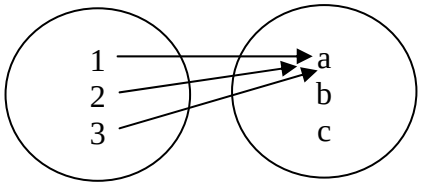


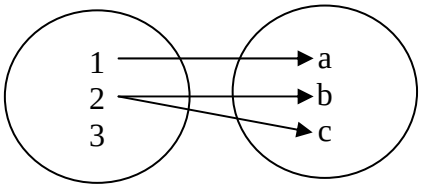
A. $A \cup B$
B. $A \cap B$
C. $B - A$
D. $A - B$

8. Which of the following is a one-one function?

A.


B.


C.


D.


9. $100 \times 3 \times 10^{-5}$ is equal to

A. 3×10^{-7}
B. 3×10^{-6}
C. 3×10^{-3}
D. 3×10^{-2}

10. $a^{-1} = \frac{1}{a}$ can be written in logarithmic form as

A. $\log_a \frac{1}{a} = -1$
B. $\log_a a = -1$
C. $\log_a \frac{1}{a} = 1$
D. $\log_a a = 1$

11. In the simplest form $\frac{1 + 2x + x^2}{1 + x}$ is equal to

A. $x(1 + x)$
B. $x(2 + x)$
C. $1 + x$
D. $2 + x$

12. Which of the following expressions is NOT a rational expression?

A. $\frac{1}{x - 1}$
B. $\frac{1}{x^2 - 1}$
C. $\frac{1}{\sqrt{(x - 1)^2}}$
D. $\frac{1}{\sqrt{x^2 - 1}}$

13. $(a + 2b + c)^2$ is equal to

A. $a^2 + 2b^2 + c^2 + 2ab + 2bc + 2ca$
B. $a^2 + 4b^2 + c^2 + 4ab + 2bc + 2ca$
C. $a^2 + 4b^2 + c^2 + 4ab + 4bc + 2ca$
D. $a^2 + 2b^2 + c^2 + 4ab + 4bc + 2ca$

14. On factorizing $3a - 6a^2 + 9a^3$ we get

A. $3a(1 - 2a + 3a^2)$
B. $3a(3 - 6a + 9a^2)$
C. $3a(-2a + 3a^2)$
D. $3a(1 - 3a + 6a^2)$

15. The factors of $(x+1)^2 - 1$ are

A. $(x+1)$ and $(x+2)$
B. x and $(x+2)$
C. $(x+1)$ and $(x-1)$
D. $(x+2)$ and $(x-1)$

16. One of the factors of $x^3 + x^2 - x - 1$ is

A. x
B. $x-1$
C. $x-2$
D. $x+2$

17. If $y = \frac{k}{x}$, then by using the following table the value of *k* is

x	3	2
y	6	9

A. $\frac{1}{2}$
B. $\frac{9}{2}$
C. 2
D. 18

18. If s varies inversely as y^2 and $s = a$ and $y = b$, then the value of the proportionality constant is

A. ab^2
B. $\frac{a}{b^2}$
C. $\frac{b^2}{a}$
D. a^2b

19. If $A = \begin{bmatrix} c & 0 \\ 3 & 1 \end{bmatrix}$ is a singular matrix, then c is equal to

A. -3
B. -1
C. 0
D. 3

20. If $A=\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is a symmetric matrix, then A^t is equal to

A. $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

B. $\begin{bmatrix} -a & -b \\ -c & -d \end{bmatrix}$

C. $\begin{bmatrix} -a & b \\ c & -d \end{bmatrix}$

D. $\begin{bmatrix} a & -b \\ -c & d \end{bmatrix}$

21. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \times \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ is equal to

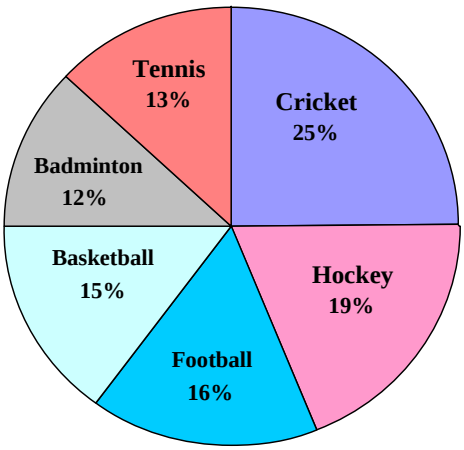
A. $\begin{bmatrix} 2 & 2 \end{bmatrix}$

B. $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$

C. $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

The given pie chart provides information about the liking of different sports in a certain school. Read the chart carefully to answer Q22 and Q23.



22. What is the central angle of the sector corresponding to the liking of basketball?

A. 15°
B. 24°
C. 26°
D. 54°

23. According to the given data, the least favourite sport is

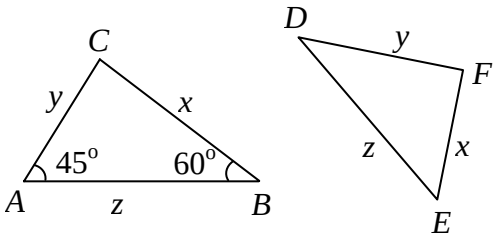
A. cricket.
B. hockey.
C. badminton.
D. tennis.

24. Which of the following statistical measurements may have more than one value?

A. Mean
B. Median
C. Mode
D. Range

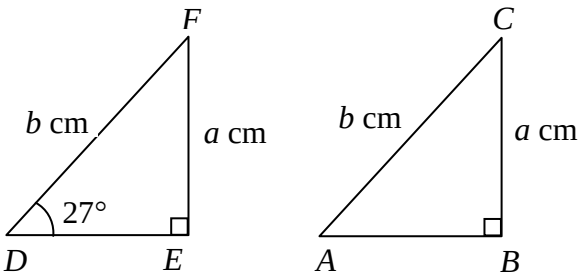
25. For the given triangles, $m\angle F$ is equal to

A. 45°
B. 60°
C. 65°
D. 75°



NOT TO SCALE

26. For the given two triangles *ABC* and *DEF*, $m\angle C$ is equal to

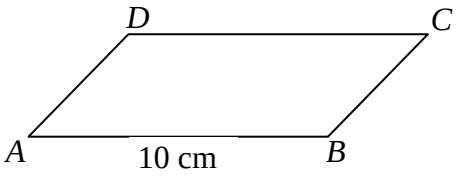


NOT TO SCALE

A. 27°
B. 33°
C. 63°
D. 67°

27. If the perimeter of the given parallelogram *ABCD* is 30 cm, then $m\overline{BC}$ is equal to

A. 5 cm
B. 10 cm
C. 15 cm
D. 20 cm



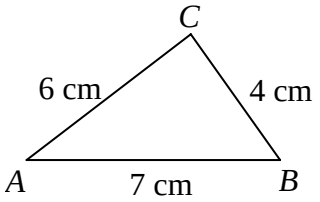
NOT TO SCALE

28. Any point equidistant from the end points of a line segment is on the

A. bisector.
B. angle bisector.
C. right bisector.
D. median.

29. In the given triangle *ABC*, which of the following conditions is TRUE?

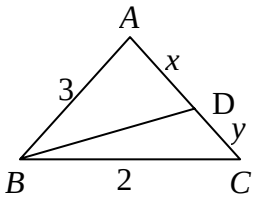
A. $m\angle A > m\angle B$
B. $m\angle B > m\angle C$
C. $m\angle A > m\angle C$
D. $m\angle C > m\angle B$



NOT TO SCALE

30. If $\overline{BD}$ is the internal bisector of $\angle ABC$, then the ratio of $x : y$ is

A. 1 : 2
B. 3 : 1
C. 2 : 3
D. 3 : 2



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END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

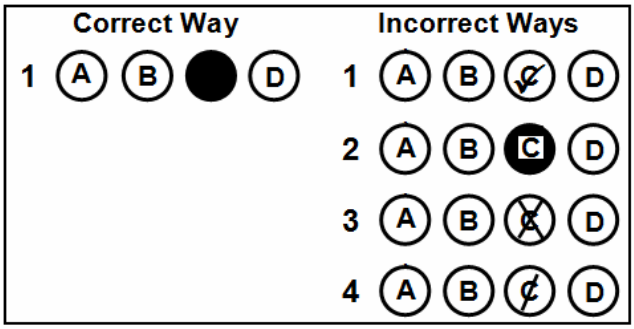
MAY 2015

Mathematics Paper I

Time: 40 minutes Marks: 30

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 30 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. The imaginary part of $-i(4i+5)$ is
[Note: $i=\sqrt{-1}$]

A. 5
B. 4
C. -4
D. -5

2. If $z=-i$, the value of $(z.\bar{z})$ will be

A. 1
B. -1
C. $\sqrt{-1}$
D. $-\sqrt{-1}$

3. $\dfrac{(-a-2)^2}{(-a-2)^3}$ is equal to

A. $(a+2)$
B. $-(a+2)$
C. $-\dfrac{1}{a+2}$
D. $-\dfrac{1}{a-2}$

4. $\left(\dfrac{4}{9}\right)^{-\frac{1}{2}}$ is equal to

A. $\left(-\dfrac{2}{3}\right)$
B. $\left(-\dfrac{3}{2}\right)$
C. $\left(\dfrac{2}{3}\right)$
D. $\left(\dfrac{3}{2}\right)$

5. If $X=\{0\}$ and $Y=\{\ \}$, $X\times Y$ is equal to

A. $\{\ \}$
B. $\{0\}$
C. $\{\{\ \}\}$
D. $\{(0,\{\ \})\}$

6. Which of the following can be an ordered pair of the relation $R = \{(x, y) \mid y = x^3\}$?

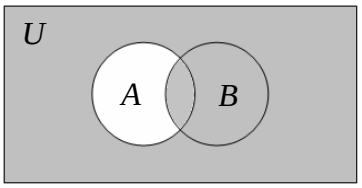
I. $(8, 2)$
II. $(1, 3)$
III. $(3, 27)$

A. I only
B. III only
C. I and II
D. II and III

7. If $f = \{(2, a), (3, c)\}$ is a function from A to B, where $A = \{2, 3\}$ and $B = \{a, b, c\}$, f is an

A. into function only.
B. onto function only.
C. into and one-one function.
D. onto and one-one function.

8. The shaded region in the given Venn diagram represents



A. A^c
B. B^c
C. $(A - B)^c$
D. $(B - A)^c$

9. $\log_3 5 + \log_3 2 - \log_3 10$ is equal to

A. 3
B. 1
C. 0
D. -3

10. Given that $\log 2 = 0.301$, $\log 20$ is equal to

A. 0.301
B. 1.301
C. 2.301
D. 3.301

11. $\frac{2a^4}{3(b+1)^2} \times 6(b+1)^2$ is equal to

A. $2a^4$
B. $4a^4$
C. $4a^2(b+1)^2$
D. $2a^4(b+1)^2$

12. $2\sqrt{5}+3\sqrt{5}-\sqrt{5}$ is equal to

A. $\sqrt{5}$
B. $2\sqrt{5}$
C. $4\sqrt{5}$
D. $5\sqrt{5}$

13. If a polynomial is defined as $P(x)=12$, $P(10)$ is equal to

A. 1
B. 2
C. 10
D. 12

14. Factorized form of $-6x^2-10x$ is

A. $2x(3x-5)$
B. $-2x(3x-5)$
C. $-2x(3x+5)$
D. $2x(3x+5)$

15. Which one of the following is a factor of x^3+2x^2+x+2?

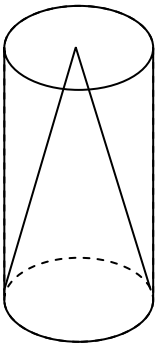
A. x
B. $x-1$
C. $x+1$
D. $x+2$

16. If the expression a^4-4a^2-b is a perfect square, the value of b is

A. -4
B. -2
C. 2
D. 4

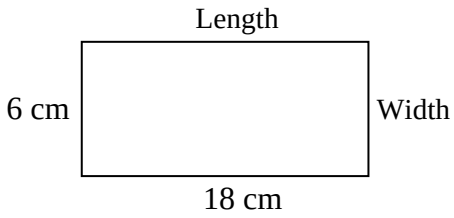
17. For equal radii, the ratio of volumes of a cone and a cylinder is 1: 3. If volume of the cylinder is $6\ \text{cm}^3$, then the volume of cone of same radius is

A. $2\ \text{cm}^3$
B. $9\ \text{cm}^3$
C. $18\ \text{cm}^3$
D. $27\ \text{cm}^3$



18. The length and width of a rectangle are shown in the figure. The ratio of width to length is

A. 1 : 4
B. 1 : 3
C. 3 : 1
D. 4 : 1



19. If two matrices *A* and *B* are defined as $A = \begin{bmatrix} x \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \end{bmatrix}$, $A \times B$ is

A. $\begin{bmatrix} 2x & 3x \end{bmatrix}$
B. $\begin{bmatrix} 2x + 3x \end{bmatrix}$
C. $\begin{bmatrix} 2x \\ 3x \end{bmatrix}$
D. not possible

20. If $X = \begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$ and *Y* is the additive inverse of *X*, $X - Y$ is equal to

A. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
B. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
C. $\begin{bmatrix} 2 & 0 \\ 4 & 6 \end{bmatrix}$
D. $\begin{bmatrix} -2 & 0 \\ -4 & -6 \end{bmatrix}$

21. If $P = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, $P \times Q^t$ is equal to

A. $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$
B. $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$
C. $\begin{bmatrix} a & 0 \\ 0 & d \end{bmatrix}$
D. $\begin{bmatrix} 0 & b \\ c & 0 \end{bmatrix}$

22. The average of 6 numbers is 10. If one of the numbers is 5, then what is the average of the remaining 5 numbers?

A. 10
B. 11
C. 12
D. 13

23. According to the following table, how many students obtained more than 30 marks?

Marks obtained	Number of Students
11 – 20	3
21 – 30	7
31 – 40	15
41 – 50	8

A. 8
B. 10
C. 15
D. 23

24. The following data represent the number of students absent in a class for 8 consecutive days.

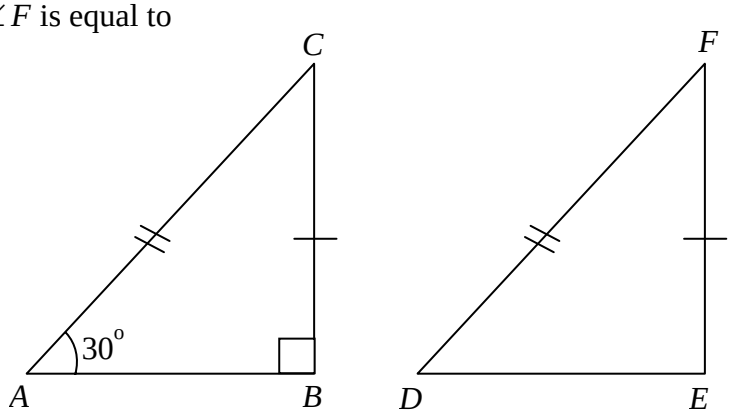
6, 6, 8, 5, 6, 7, 8, 7

The median of the number of students absent is

A. 5
B. 5.5
C. 6
D. 6.5

25. If $\Delta ABC \cong \Delta DEF, m\angle F$ is equal to

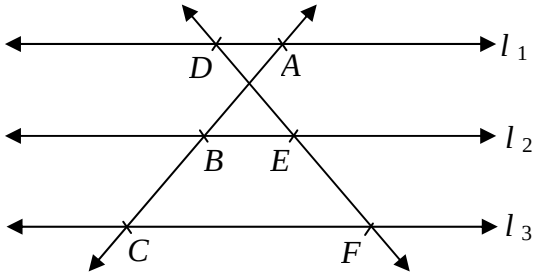
A. 90°
B. 60°
C. 30°
D. 20°



NOT TO SCALE

26. In the given figure, l_1, l_2 and l_3 are three parallel lines. If $m\overline{AB} = m\overline{BC} = 3\,\text{cm}$ and $m\overline{EF} = 4\,\text{cm}$, then $m\overline{DE}$ is equal to

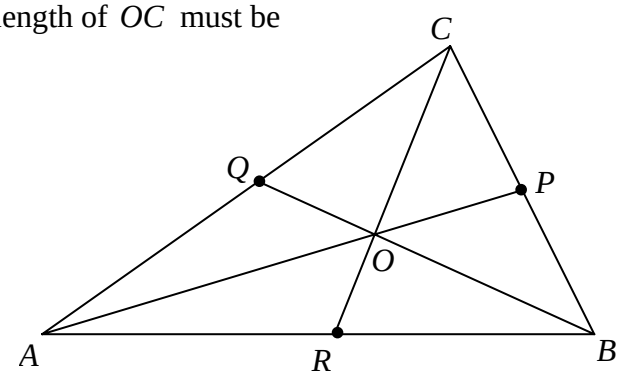
A. 7 cm
B. 4 cm
C. 3 cm
D. 2 cm



NOT TO SCALE

27. In the given triangle ABC, $\overline{AP}$, $\overline{BQ}$ and $\overline{CR}$ are the medians intersecting at point O, such that $m\overline{RO} = a$. The length of $\overline{OC}$ must be

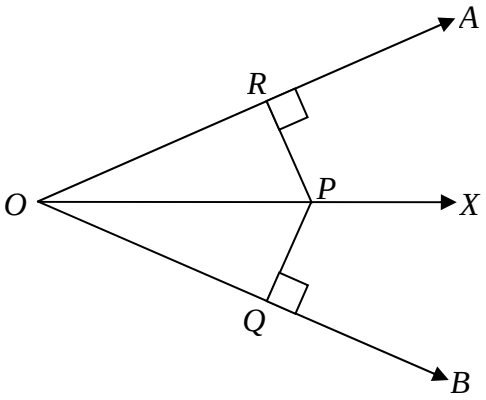
A. $\frac{2}{3}a$
B. $\frac{3}{2}a$
C. $2a$
D. $3a$



NOT TO SCALE

28. In the given figure, $\overline{OX}$ is the angle bisector of $\angle AOB$. If $m\overline{PQ} = 3\,\text{cm}$, then $m\overline{PR}$ is

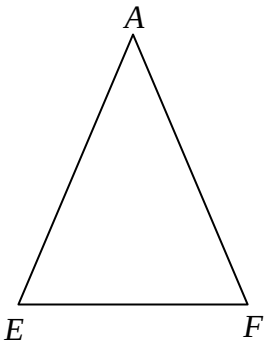
A. 2 cm
B. 3 cm
C. 4 cm
D. 6 cm



NOT TO SCALE

29. For the given triangle *AEF*, which of the following options is correct?

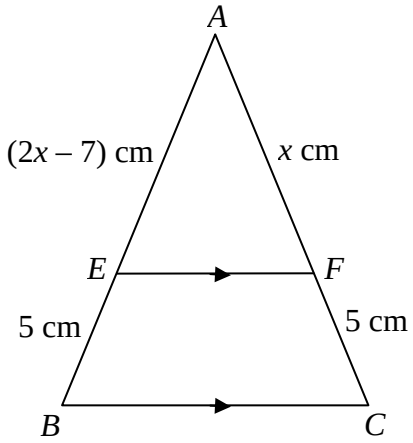
A. $m\overline{AE} + m\overline{AF} = m\overline{EF}$
B. $m\overline{AE} + m\overline{AF} < m\overline{EF}$
C. $m\overline{AE} + m\overline{AF} \geq m\overline{EF}$
D. $m\overline{AE} + m\overline{AF} > m\overline{EF}$



NOT TO SCALE

30. In the given figure $\overline{EF}$ is parallel to $\overline{BC}$. The length of $\overline{AC}$ is equal to

A. 5 cm
B. 7 cm
C. 12 cm
D. 14 cm



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END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2016

Mathematics Paper I

Time: 40 minutes Marks: 30

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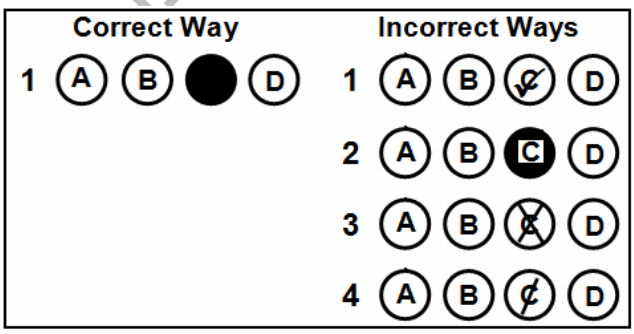


Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. Which of the following is a rational number?

   A. $\sqrt{2}$
   B. π
   C. 3.33333…
   D. 3.2137814115…

2. $\dfrac{a}{a^3 \times a^{-2}}$ is equal to

   A. 0
   B. 1
   C. a^2
   D. $\dfrac{1}{a}$

3. $\left(a^{\,2}\right)^{-3}$ is equal to

   A. $-a^{-6}$
   B. a^{-1}
   C. a^{-6}
   D. a^{-8}

4. If $a + 2i = b + 2i$, then

   A. $a - b = 0$
   B. $a + b = 0$
   C. $a + b = 2$
   D. $a - b = 2$

5. Given that $A = \{a\}$ and $B = \{1, 2\}$, then $B - A$ is equal to

   A. { }
   B. $\{a\}$
   C. $\{1, 2\}$
   D. $\{1 - a, 2 - a\}$

6. Given that $A = \{a, b\}$, $B = \{1, 2\}$ and $C = \{2, 3\}$, then $(A \cap B) \cup C$

   A. { }
   B. $\{a, b\}$
   C. $\{2, 3\}$
   D. $\{a, b, 1, 2, 3\}$

7. Which of the following options represents the distributive property of intersection over union for three non-empty sets *A*, *B* and *C* ?

A. $(A \cap B) \cup C = (A \cap B) \cup (A \cap C)$
B. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
C. $(A \cap B) \cup C = (A \cap C) \cup (B \cap C)$
D. $A \cap (B \cup C) = (A \cup B) \cap (A \cup C)$

8. If $A = \{a, b\}$ and $B = \{2, 3\}$, then one of the relation from *A* to *B* is

A. $\{(a, b), (2, 3)\}$
B. $\{(a, 3), (2, b)\}$
C. $\{(a, 2), (a, 3)\}$
D. $\{(2, a), (3, b)\}$

9. 0.00717 is equal to

A. 71.7×10^{-3}
B. 7.17×10^{-3}
C. 7.17×10^{-2}
D. 71.7×10^{-2}

10. The logarithmic form of $a^{-3} = x$ is

A. $\log_{-3} a = x$
B. $\log_x a = -3$
C. $\log_a x = -3$
D. $-\log_3 a = x$

11. In simplified form, $\frac{(x-1)^2}{x^2-1}$ is equal to

A. 1
B. $\frac{x+1}{x-1}$
C. $\frac{x-1}{x+1}$
D. $\frac{1}{x+1}$

12. If $a = 1$ and $b = -1$, then the value of $\frac{a^2 - b^2}{a^2 + b^2}$ is equal to

A. -1
B. 0
C. 1
D. 2

13. Given that $(a-b)^2 = 16$ and $a^2 + b^2 = 26$ then ab is equal to

A. -10
B. -5
C. 5
D. 10

14. On complete factorisation of $-(\frac{2}{x}) - (\frac{4}{x^2})$, we get

A. $-\frac{2}{x}(1-\frac{2}{x})$
B. $-\frac{2}{x}(1+\frac{2}{x})$
C. $\frac{2}{x}(1-\frac{2}{x})$
D. $\frac{2}{x}(1-\frac{4}{x})$

15. On complete factorisation of $-by^2 + b^3$, we get

A. $-b(y^2 + b^2)$
B. $-b(y^2 - b^3)$
C. $-b(y-b)(y-b)$
D. $-b(y-b)(y+b)$

16. On complete factorisation of $c^2 - c - 2$, we get

A. $(c+1)(c-2)$
B. $(c-1)(c+2)$
C. $(c-1)(c-2)$
D. $(c-1)(c-1)$

17. If x, y and z are in continued proportion, then which of the following options is CORRECT?

A. $x = yz$
B. $z = xy$
C. $y^2 = xz$
D. $x^2 = yz$

18. If $y = \frac{k}{x}$, then by using the following table, the value of k is

x	3	2
y	6	9

A. $\frac{1}{2}$
B. $\frac{9}{2}$
C. 2
D. 18

19. The transpose of the matrix $\begin{bmatrix} a & -c \\ -d & b \end{bmatrix}$ is

A. $\begin{bmatrix} b & -c \\ -d & a \end{bmatrix}$.
B. $\begin{bmatrix} a & -d \\ -c & b \end{bmatrix}$.
C. $\begin{bmatrix} -a & c \\ d & -b \end{bmatrix}$.
D. $\begin{bmatrix} b & c \\ d & a \end{bmatrix}$.

20. $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \times \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ is

A. not possible.
B. $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$.
C. $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$.
D. $\begin{bmatrix} 1 & -1 \\ 1 & -1 \end{bmatrix}$.

21. The determinant of the matrix $\begin{bmatrix} -2 & 0 \\ -5 & 10 \end{bmatrix}$ is

A. -25
B. -20
C. -15
D. 15

22. Which of the following statistical measurements may have more than one value for a set of data?

A. Mean
B. Median
C. Mode
D. Range

23. The median of the data 18, 3, 17, 1, 18, 5, 2 is

A. 5
B. 17
C. 17.5
D. 18

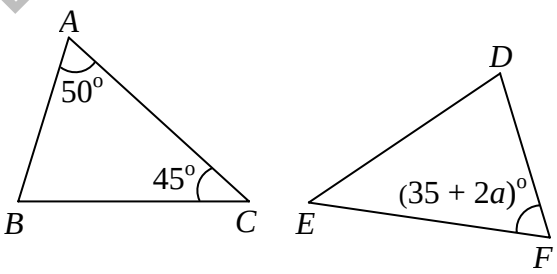
24. The mean of 10 numbers is 13. If 5 is subtracted from every number, then the new mean will become

A. 5
B. 6.5
C. 8
D. 12.5

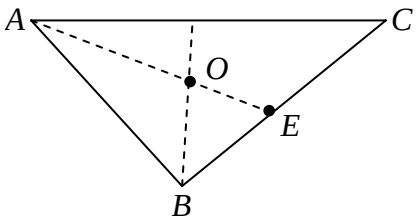
25. If $\Delta ABC \cong \Delta DFE$, then the value of a is equal to

A. 20^o
B. 25^o
C. 35^o
D. 50^o

NOT TO SCALE



26. If O is the point of concurrency of medians of the triangle ABC and $m\overline{OE} = 5\text{cm}$, then $m\overline{AO}$ is



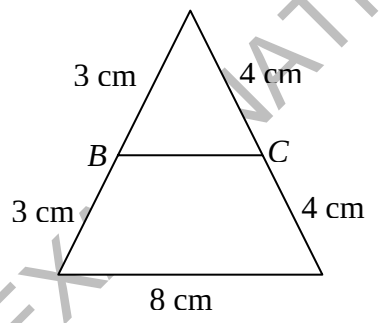
NOT TO SCALE

A. 2.5 cm
B. 5 cm
C. 10 cm
D. 15 cm

27. In the given diagram, $m\overline{BC}$ is equal to

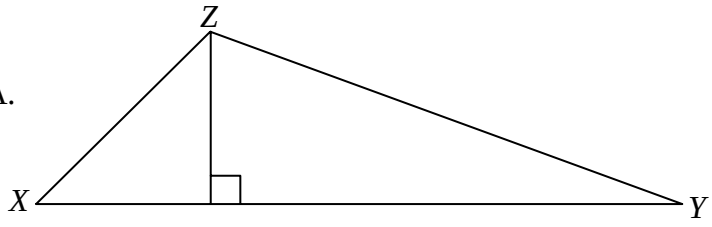
NOT TO SCALE

A. 3 cm
B. 4 cm
C. 5 cm
D. 6 cm

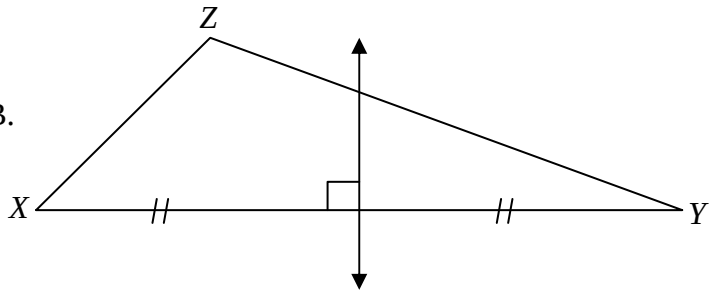


28. Which of the following diagrams represents a right bisector of the side *XY* of the triangle *XYZ?*

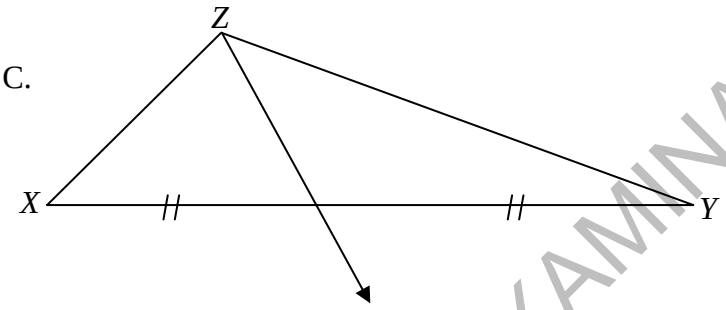
A.



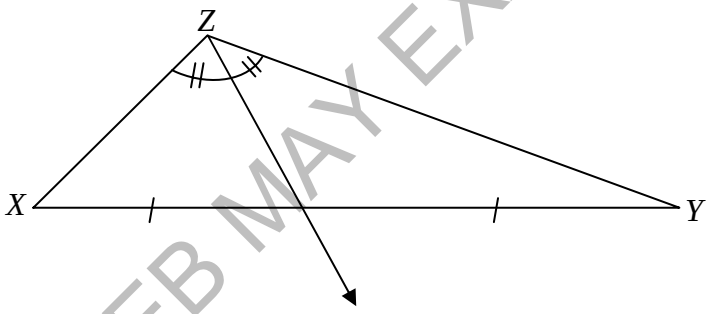
B.



C.

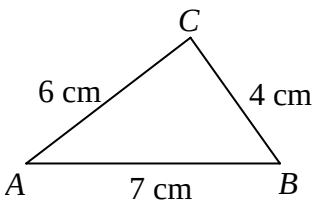


D.



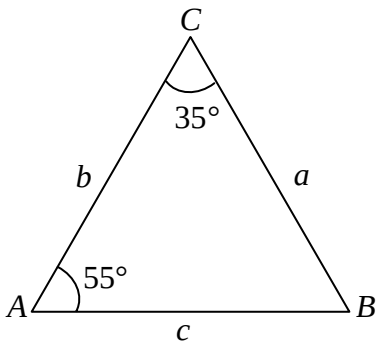
29. In the given triangle *ABC*, which of the following conditions is TRUE?

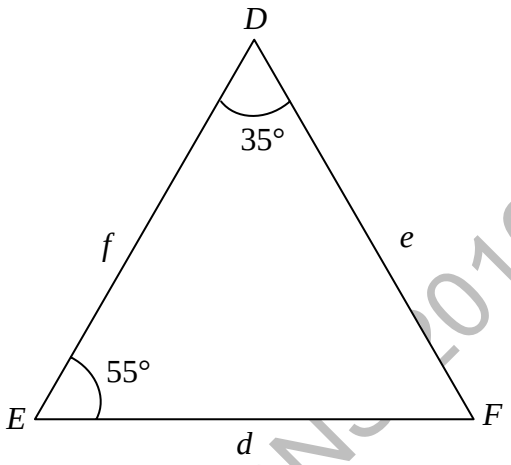
A. $m\angle A > m\angle B$
B. $m\angle B > m\angle C$
C. $m\angle A > m\angle C$
D. $m\angle C > m\angle B$



NOT TO SCALE

30. For the given ΔABC and ΔDEF, which of the following options is TRUE?





A. $\frac{a}{e} = \frac{f}{b}$

B. $af = be$

C. $a + b = e + f$

D. $b - a = f - e$

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

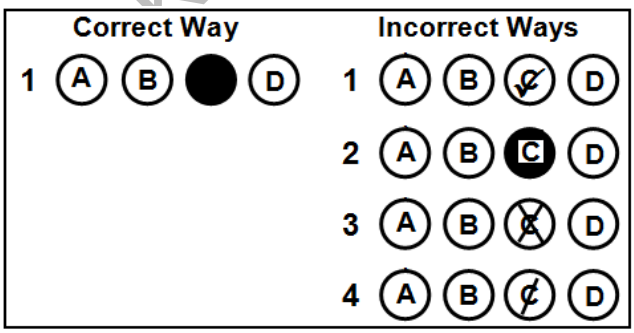
APRIL/ MAY 2017

Mathematics Paper I

Time: 40 minutes Marks: 30

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 30 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. The real part of $i(2i-1)$ is

   A. -2
   B. -1
   C. 1
   D. 2

2. If $Z = 10 + i,$ then the value of $Z \times \overline{Z}$ will be

   A. 99
   B. 101
   C. $99 - 20i$
   D. $101 + 20i$

3. $\dfrac{8^{\frac{1}{3}}}{2}$ is equal to

   A. 0
   B. 1
   C. $2^{\frac{2}{3}}$
   D. 2

4. If $5^a \times 5^3 = 25$, then the value of a is

   A. -2
   B. -1
   C. 1
   D. 2

5. If $A = \{1, 2, 3, 4\}$ and $B = \{10, 20\}$, then the number of elements in the Cartesian product $A \times B$ is

   A. 18
   B. 16
   C. 8
   D. 6

6. For any three sets X, Y and Z, the associative property with respect to union is

   A. $X \cup (Y \cup Z) = (X \cup Y) \cup Z$
   B. $X \cup (Y \cap Z) = (X \cap Y) \cup Z$
   C. $X \cap (Y \cup Z) = (X \cup Y) \cap Z$
   D. $X \cup (Y \cap Z) = (X \cup Y) \cap (X \cup Z)$

7. Which of the following can be an ordered pair of the relation $R = \{(x, y) \mid y = x^3\}$?

I. (8, 2)
II. (1, 3)
III. (3, 27)

A. I only
B. III only
C. I and II
D. II and III

8. If $K = L = \{2, 3\}$ and $K \cap M = L$, then which of following options is TRUE for the set M ?

I. {2, 3}
II. {1, 3, 5}
III. {1, 2, 3, 6}

A. I only
B. II only
C. I and III
D. II and III

9. $\log_5 7$ can also be expressed as

A. $\dfrac{\log_3 7}{\log_3 5}$
B. $\dfrac{\log_3 5}{\log_3 7}$
C. $\log_3 \dfrac{7}{5}$
D. $\log_3 7 + \log_3 5$

10. 0.0036 expressed in scientific notation is

A. 36×10^{-4}
B. 3.6×10^{-3}
C. 3.6×10^{3}
D. 36×10^{4}

11. $3\sqrt{5} - 10\sqrt{5}$ is equal to

A. $-30\sqrt{5}$
B. $49\sqrt{5}$
C. $-7\sqrt{5}$
D. $7\sqrt{5}$

12. If $W = \frac{t(u+1)}{v}$ and $t = 2$, $u = -1$ and $v = 5$, then the value of W is

A. 0
B. $\frac{2}{5}$
C. $\frac{4}{5}$
D. 1

13. The simplified form of $\frac{x^2 - y^2}{x^3 + y^3}$ is

A. $\frac{(x+y)}{(x^2 - xy + y^2)}$
B. $\frac{(x+y)}{(x^2 + xy + y^2)}$
C. $\frac{(x-y)}{(x^2 - xy + y^2)}$
D. $\frac{(x-y)}{(x^2 + xy + y^2)}$

14. The factors of $100q^2 - 9r^2$ are

A. $(10q - 3r)^2$
B. $(100q - 9r)^2$
C. $(10q + 3r)(10q - 3r)$
D. $(100q + 9r)(100q - 9r)$

15. If $(x - b)$ is a factor of a polynomial $P(x)$, then $P(b)$ is equal to

A. $-b$
B. b
C. 0
D. 1

16. If $P(x) = x^3 + 1$ is divided by $(x + 2)$, then the remainder is

A. -7
B. -5
C. 7
D. 9

17. Given that y is directly proportional to the square root of x and k is the constant of proportionality. Mathematically, this can be expressed as

A. $y = \frac{k}{\sqrt{x}}$

B. $x = \frac{\sqrt{y}}{k}$

C. $y = k\sqrt{x}$

D. $x = k\sqrt{y}$

18. It is given that $y \propto \frac{1}{x}$ and k is the constant of proportionality. If $x = 2$ and $y = 3$, then k is equal to

A. $\frac{3}{2}$

B. $\frac{2}{3}$

C. 5

D. 6

19. If $A = \begin{bmatrix} 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$, then $A \times B$ is

A. $\begin{bmatrix} 17 \end{bmatrix}$

B. $\begin{bmatrix} 2 \\ 15 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 15 \end{bmatrix}$

D. not possible.

20. The adjoint of matrix $\begin{bmatrix} -2 & -6 \\ 1 & 5 \end{bmatrix}$ is

A. $\begin{bmatrix} 2 & 6 \\ -1 & -5 \end{bmatrix}$

B. $\begin{bmatrix} 5 & 1 \\ -6 & -2 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 1 \\ -6 & -5 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 6 \\ -1 & -2 \end{bmatrix}$

21. If $\begin{bmatrix} 5 & -1 \\ 2 & 3 \end{bmatrix} + A = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, then the value of A is

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 5 & -1 \\ 2 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 3 & 1 \\ -2 & 5 \end{bmatrix}$

D. $\begin{bmatrix} -5 & 1 \\ -2 & -3 \end{bmatrix}$

22. The average of 6 numbers is 10. If one of the numbers is 5, then what is the average of the remaining 5 numbers?

A. 10
B. 11
C. 12
D. 13

23. According to the following table, how many students obtained more than 30 marks?

Marks Obtained	Number of Students
11 – 20	3
21 – 30	7
31 – 40	15
41 – 50	8

A. 8
B. 10
C. 15
D. 23

24. The following data represents the number of students absent in a class for 8 consecutive days.

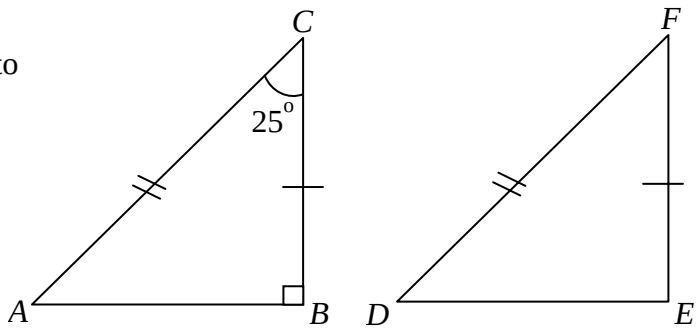
6, 6, 8, 5, 6, 7, 8, 7

The median of the number of students absent is

A. 5
B. 5.5
C. 6
D. 6.5

25. If $\Delta ABC \cong \Delta DEF$, then $\angle D$ is equal to

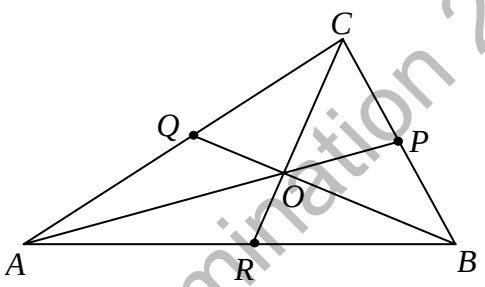
A. 25°
B. 55°
C. 65°
D. 75°



NOT TO SCALE

26. In the given triangle *ABC*, *AP*, *BQ* and *CR* are the medians intersecting at point *O*, such that $QB = 3a$. The length of *OQ* must be

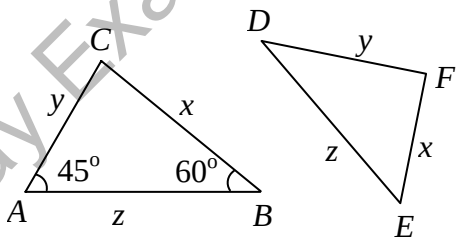
A. a
B. $2a$
C. $\frac{1}{3}a$
D. $\frac{3}{2}a$



NOT TO SCALE

27. For the given triangles, $\angle F$ is equal to

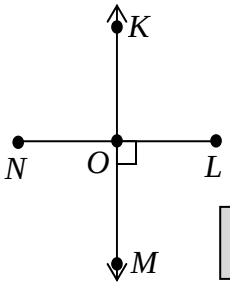
A. 45°
B. 60°
C. 65°
D. 75°



NOT TO SCALE

28. In the given diagram, if *KM* is the right bisector of *NL*, then which of the following conditions is TRUE?

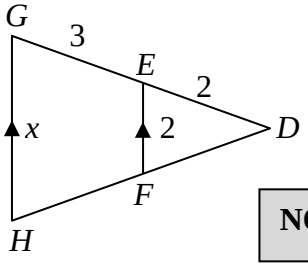
A. $KO = OL$
B. $KM = LN$
C. $KL = KN$
D. $KN = LM$



NOT TO SCALE

29. In the given diagram, the value of *x* is equal to

A. 2
B. 3
C. 4
D. 5



NOT TO SCALE

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

APRIL/ MAY 2018

Mathematics Paper I

Time: 40 minutes Marks: 30

INSTRUCTIONS

1. Read each question carefully.
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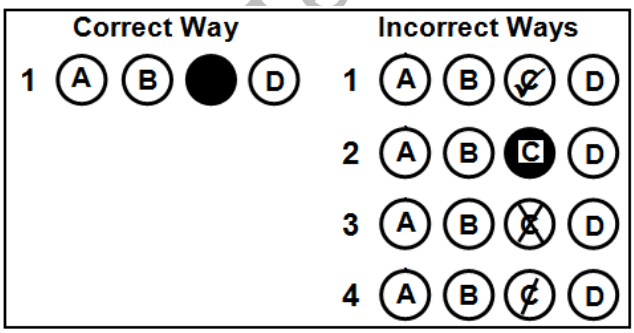


Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. On simplification, $\frac{x^2}{x^{-4}}$ becomes

   A. $\frac{1}{x^2}$
   B. $\frac{1}{x^6}$
   C. x^2
   D. x^6

2. If $p = \frac{11}{5}$ and $q + r = \frac{14}{5}$, then $(p + q) + r$ is equal to

   A. $\frac{3}{5}$
   B. $\frac{5}{2}$
   C. 2
   D. 5

3. If p and q are real numbers, and p^{-1} is the multiplicative inverse of p, then which of the following statements is FALSE?

   A. $p \times q$ is a real number
   B. $p \times q = q \times p$
   C. $p \times p^{-1} = 0$
   D. $p \times 1 = p$

4. $\sqrt{2^3}$ can also be expressed as

   A. $2^{\frac{3}{2}}$
   B. $2^{\frac{2}{3}}$
   C. $8^{\frac{3}{2}}$
   D. $8^{\frac{2}{3}}$

5. Set A is defined as $A = \{1, 2, 3\}$. If $A \cup B = \{1, 2, 3, 4, 5\}$ and $A \cap B = \phi$, then set B is equal to

   A. ϕ
   B. {4, 5}
   C. {1, 2, 3}
   D. {1, 2, 3, 4, 5}

6. If $A = \{a, b\}$ and $B = \{10, 20\}$, then which of the following option(s) is/ are binary relation from A to B?

I. $\{(a, 10), (b, 20)\}$
II. $\{(10, a), (20, b)\}$
III. $\{(a, 20)\}$
IV. $\{(10, b)\}$

A. I only
B. II only
C. I and III
D. II and IV

7. If a universal set is defined as $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ and E is the set of even numbers, then E' is

A. ϕ
B. $\{1, 3, 5, 7, 9\}$
C. $\{2, 4, 6, 8, 10\}$
D. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

8. If $X = \{10, 20\}$ and $Y = \{p, q, r\}$, then which of the following represents a function from X to Y?

A. $\{(10, p)\}$
B. $\{(10, p), (10, q)\}$
C. $\{(10, p), (20, p)\}$
D. $\{(10, p), (10, q), (20, r)\}$

9. The exponential form of $\log_3 5 = 2x$ is

A. $3^{2x} = 5$
B. $5^{2x} = 3$
C. $(2x)^3 = 5$
D. $(2x)^5 = 3$

10. If $\log_6 x = 2$, then x is equal to

A. 3
B. 12
C. 36
D. 64

11. On rationalisation of $\frac{1}{2+\sqrt{3}}$, we get

A. $2+\sqrt{3}$
B. $2-\sqrt{3}$
C. $-2+\sqrt{3}$
D. $-2-\sqrt{3}$

12. $\frac{a^4-4a^2}{a^2-2a}$ is equal to

A. a^2+2a
B. a^2-2a
C. a^2+4a
D. a^2-4a

13. $2\left(\sqrt{2}+1\right)-3\sqrt{2}$ is equal to

A. $2+\sqrt{2}$
B. $2-\sqrt{2}$
C. $2+5\sqrt{2}$
D. $2-5\sqrt{2}$

14. u^3-27v^3 can also be expressed as

A. $(u+3v)\left(u^2-uv+v^2\right)$
B. $(u-3v)\left(u^2+uv+v^2\right)$
C. $(u+3v)\left(u^2-3uv+9v^2\right)$
D. $(u-3v)\left(u^2+3uv+9v^2\right)$

15. On factorisation of $25x^2+5ax+10x+2a$, we get

A. $(5x+a)(5x+2)$
B. $(5a+x)(5a+2)$
C. $\left(5x^2+a\right)(5x+2)$
D. $(5ax+a)(5ax+2)$

16. $8p^3+12p^2q+6pq^2+q^3$ can also be expressed as

A. $(2p)^3+q^3$
B. $(2p+q)^3$
C. $(p+2q)^3$
D. p^3+2q^3

17. If $a : b :: c : d$, then according to componendo property

A. $a+b:b::c+d:d$
B. $a-b:b::c-d:d$
C. $a+b:a::c+d:c$
D. $a-b:a::c-d:c$

18. Ali bought an efficient washing machine that saves 10 gallons of water per load. How many gallons of water will he save if he washes 15 loads of laundry?

A. 0.15
B. 1.5
C. 15
D. 150

19. If P is a 1×3 matrix and Q is a 3×1 matrix, then which one of the following represents a matrix of order 1×1?

A. Q^2
B. P^2
C. PQ
D. QP

20. If $\begin{bmatrix} 2 & 3 \\ -3 & 0 \end{bmatrix} + Q = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, then Q is equal to

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
B. $\begin{bmatrix} 0 & -3 \\ 3 & 2 \end{bmatrix}$
C. $\begin{bmatrix} 2 & 3 \\ -3 & 0 \end{bmatrix}$
D. $\begin{bmatrix} -2 & -3 \\ 3 & 0 \end{bmatrix}$

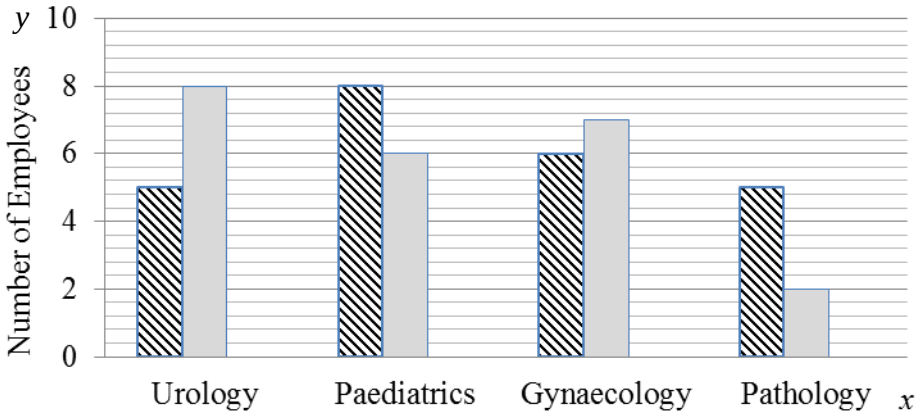
21. The determinant of the matrix $\begin{bmatrix} 5 & -3 \\ 1 & 2 \end{bmatrix}$ is equal to

A. 3
B. 7
C. 13
D. 10

22. The ages (in years) of nine children in a group are 4, 7, 8, 9, 6, 10, 5, 8 and 10. The median age is

A. 6
B. 7
C. 8
D. 10

The given bar chart shows the number of employees hired by a hospital in various departments in the years 2015 and 2016.



Using the given information, answer Q.23 and Q.24.

23. In Paediatrics department, the percentage change shows that hiring in 2016 as compared to last year has

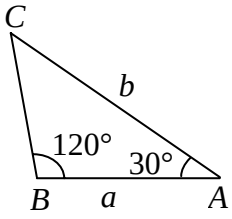
A. decreased by 25%
B. decreased by 33%
C. increased by 25%
D. increased by 33%

24. The number of employees hired in 2016 are

A. 4
B. 5
C. 23
D. 24

25. In the given triangle *ABC*, the side *BC* is equal to

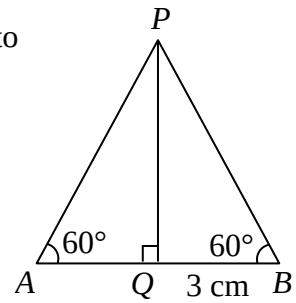
A. $b-a$
B. a
C. $2a$
D. $\frac{b+a}{2}$



NOT TO SCALE

26. In the given diagram, the side AB is equal to

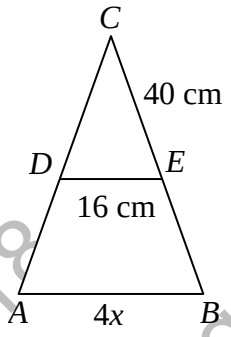
A. 3 cm
B. 4 cm
C. 6 cm
D. 7 cm



NOT TO SCALE

27. In the given diagram, D and E are the midpoints of the sides AC and BC respectively. If $AB = 4x$, $DE = 16$ cm and $EC = 40$ cm, then the value of x is equal to

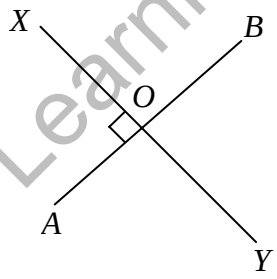
A. 8 cm
B. 12 cm
C. 16 cm
D. 32 cm



NOT TO SCALE

28. In the given diagram, the line XY bisects the line segment AB. If the length of AB is a cm, then the length of OA is equal to

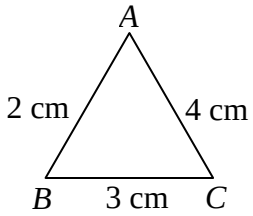
A. a
B. $\frac{a}{2}$
C. a^2
D. $2a$



NOT TO SCALE

29. For the given triangle ABC, which one of the following is TRUE?

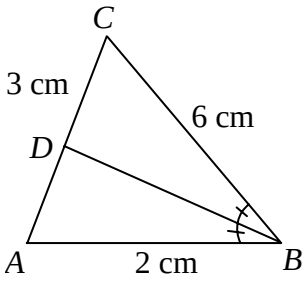
A. $m\angle C < m\angle A < m\angle B$
B. $m\angle B < m\angle A < m\angle C$
C. $m\angle A < m\angle B < m\angle C$
D. $m\angle C < m\angle B < m\angle A$



NOT TO SCALE

30. In the following figure, BD is the angle bisector of $\angle ABC$. If $AB = 2$ cm, $BC = 6$ cm, and $CD = 3$ cm, then the length of AD is

A. 1 cm
B. 2 cm
C. 3 cm
D. 4 cm



NOT TO SCALE

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

APRIL/ MAY 2019

Mathematics Paper I

Time: 50 minutes Marks: 35

INSTRUCTIONS

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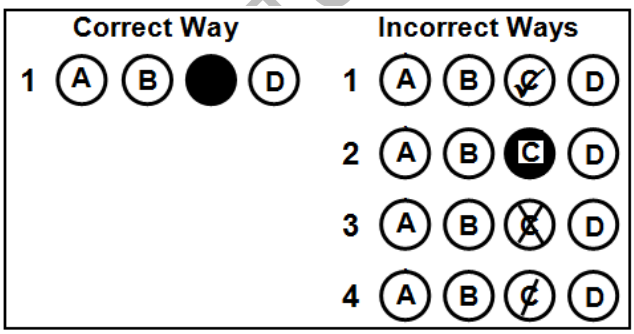


Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a simple calculator if you wish.

1. Given that $A = \{a\}$ and $B = \{1, 2\}$, then $B - A$ is equal to

   A. $\{\ \}$
   B. $\{a\}$
   C. $\{1, 2\}$
   D. $\{1-a, 2-a\}$

2. If $U = \{1,2,3,4,5\}$ and $A \cup B = \{1,2,3,4\}$, then $A^c \cap B^c$ is equal to

   A. ϕ
   B. $\{5\}$
   C. $\{1,2,3,4\}$
   D. $\{1,2,3,4,5\}$

3. For the three non-empty sets *X*, *Y* and *Z*, the CORRECT option is

   A. $(X \cup Y) \cap Z = X \cup (Y \cap Z)$
   B. $(X \cup Y) \cup Z = X \cup (Y \cap Z)$
   C. $(X \cap Y) \cap Z = X \cap (Y \cup Z)$
   D. $(X \cup Y) \cup Z = X \cup (Y \cup Z)$

4. For a given binary relation $r = \{(a,a),(a,b),(b,c),(b,d)\}$, the range is

   A. $\{a,b\}$
   B. $\{a,b,c\}$
   C. $\{a,c,d\}$
   D. $\{a,b,c,d\}$

5. For the sets $A = \{a,e,i\}$ and $B = \{1,2,3,4\}$, the function from *A* to *B* will be

   A. $\{(a,1),(e,2)\}$
   B. $\{(a,1),(e,1),(i,1)\}$
   C. $\{(a,1),(a,2),(a,3),(a,4)\}$
   D. $\{(a,1),(e,2),(i,3),(a,4)\}$

6. If $2i + 3 = b + ai - 3i$, then the value of *a* will be

   A. -2
   B. -1
   C. 1
   D. 5

7. On simplification of $ai + ib - b - a$, we get

A. $(a+b)i - 1$
B. $(a+b)(i-1)$
C. $a - b + (a+b)i$
D. $(a-b)i + a + b$

8. Which of the following fractions is a terminating decimal fraction?

A. $\frac{4}{3}$
B. $\frac{3}{4}$
C. $\frac{\sqrt{3}}{2}$
D. $\frac{1}{\sqrt{3}}$

9. $\sqrt{\frac{a^2 \times b}{b^3}}$ is equal to

A. $\frac{a^2}{b^2}$
B. $\frac{a}{b}$
C. $\pm\frac{a}{b}$
D. $\pm ab^2$

10. If $5 \times 10^{-b} = 0.0500$, then b is equal to

A. -2
B. -1
C. 1
D. 2

11. The logarithmic form of $a^{-3} = \frac{1}{16}$ will be written as

A. $\log_a \frac{1}{16} = -3$
B. $\log_a 16 = -3$
C. $\log_{\frac{1}{16}} 3 = a$
D. $\log_3 \frac{1}{16} = -a$

12. The logarithmic expression $\frac{\log_3 x}{\log_3 y}$ can also be written as

A. $\log_x y$
B. $\log_y x$
C. $\log_3 \frac{x}{y}$
D. $\log_3 (x - y)$

13. For $a = -1$ and $b = -1$, the value of $a^2 - 2ab^2$ is equal to

A. -3
B. -1
C. 1
D. 3

14. The value of $a^2 + b^2$, when $(a+b)^2 = 81$ and $ab = 20$, is equal to

A. 41
B. 61
C. 81
D. 121

15. On simplification of $\frac{6+\sqrt{35}}{3-\sqrt{8}} \times \frac{6-\sqrt{35}}{3+\sqrt{8}}$, we get

A. -2
B. -1
C. 1
D. 2

16. In simplified form, $\frac{(x-1)^2}{x^2-1}$ is equal to

A. 1
B. $\frac{x+1}{x-1}$
C. $\frac{x-1}{x+1}$
D. $\frac{1}{x+1}$

17. On complete factorisation of $9-(3a-b)^2$, we get

A. $(3+3a+b)(3+3a-b)$
B. $(3-3a+b)(3+3a-b)$
C. $(9-3a+b)(9+3a-b)$
D. $(9+3a+b)(9+3a-b)$

18. The factors of $x^2+2x+2xy+4y$ are

A. $3x$ and $(x+2y)$.
B. $3x$ and $(x+4y)$.
C. $(x+2)$ and $(x+4y)$.
D. $(x+2)$ and $(x+2y)$.

19. On complete factorisation of $2a^3-2$, we get

A. $2(a-1)(a^2+2a+1)$
B. $2(a-1)(a^2+a+1)$
C. $2(a-1)(a^2-a+1)$
D. $2(a-1)(a^2-2a+1)$

20. One of the factors of x^3+x^2-4x-4 is

A. x
B. $x-1$
C. $x+1$
D. $x+4$

21. For x^2-2x^3-3, one of the zeros of the given polynomial is

A. -2
B. -1
C. 0
D. 1

22. If $a : b = c : d$, then according to the invertendo property, we get

A. $b : a = d : c$
B. $a : b = d : c$
C. $b : a = c : d$
D. $a : c = b : d$

23. If numbers *k*, 5 and 25 are in continued proportion, then the value of k is

A. 1
B. 5
C. $\frac{1}{5}$
D. 125

24. The matrix $\begin{bmatrix}1 & 1 & 1\end{bmatrix}$ is a

I. unit matrix.
II. row matrix.
III. rectangular matrix.

A. I only.
B. III only.
C. I and II.
D. II and III.

25. The transpose of the matrix $\begin{bmatrix}2 & 3 & 1\\ 2 & 3 & 1\end{bmatrix}$ is

A. $\begin{bmatrix}2 & 1 & 3\\ 2 & 1 & 3\end{bmatrix}$
B. $\begin{bmatrix}1 & 3 & 2\\ 1 & 3 & 2\end{bmatrix}$
C. $\begin{bmatrix}2 & 2\\ 3 & 3\\ 1 & 1\end{bmatrix}$
D. $\begin{bmatrix}1 & 1\\ 3 & 3\\ 2 & 2\end{bmatrix}$

26. If $A = \begin{bmatrix}2 & 3\end{bmatrix}$ and $B = \begin{bmatrix}1\\ 5\end{bmatrix}$, then $A \times B$

A. is $\begin{bmatrix}17\end{bmatrix}$
B. is $\begin{bmatrix}2\\ 15\end{bmatrix}$
C. is $\begin{bmatrix}2 & 15\end{bmatrix}$
D. cannot be determined.

27. If $A = \begin{bmatrix} a & 18 \\ 2 & a \end{bmatrix}$ is a singular matrix, then the possible value(s) of a will be

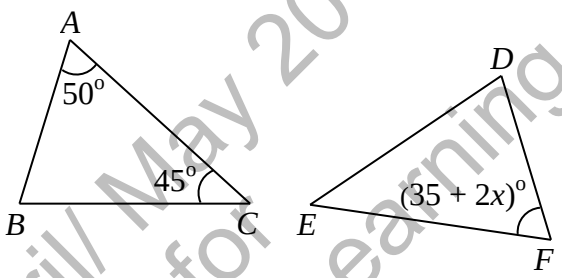
A. 0
B. ± 18
C. ± 6
D. 9

28. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then $|AdjA|$ will be

A. -10
B. -2
C. 2
D. 10

29. If $\Delta ABC \cong \Delta DFE$, then the value of x is equal to

A. 20^o
B. 25^o
C. 35^o
D. 50^o

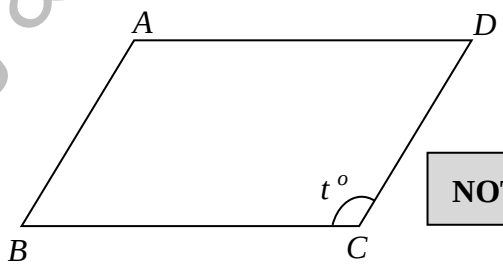


NOT TO SCALE

30. For the given parallelogram $ABCD$, the CORRECT option is

I. $\angle B = \angle C$
II. $|AB| = |CD|$
III. $\angle D = 180^o - t^o$

A. I only.
B. III only.
C. I and II.
D. II and III.

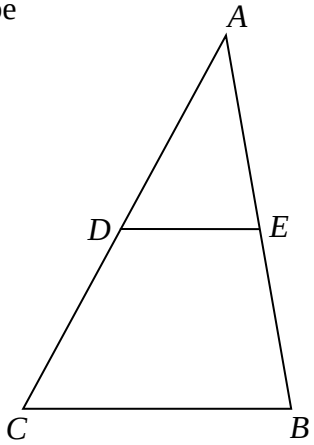


NOT TO SCALE

31. The given figure shows a triangle ABC, where D and E are the midpoints of sides AC and AB respectively. The CORRECT option will be

I. $AD = AE$
II. $DE = \frac{1}{2} BC$
III. DE is parallel to BC

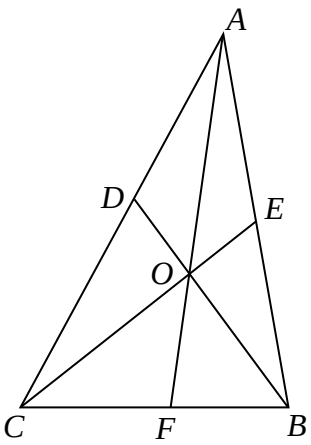
A. I only.
B. II only.
C. II and III.
D. I and III.



NOT TO SCALE

32. The given figure shows a triangle *ABC*. Its medians *AF*, *BD* and *CE* are intersecting at point *O*. If *AF* = 6 cm, then *OA* is equal to

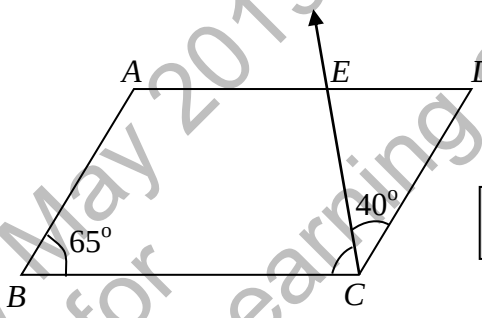
A. 1 cm
B. 2 cm
C. 3 cm
D. 4 cm



NOT TO SCALE

33. The given figure shows a parallelogram *ABCD*, the measurement of angle *BCE* is

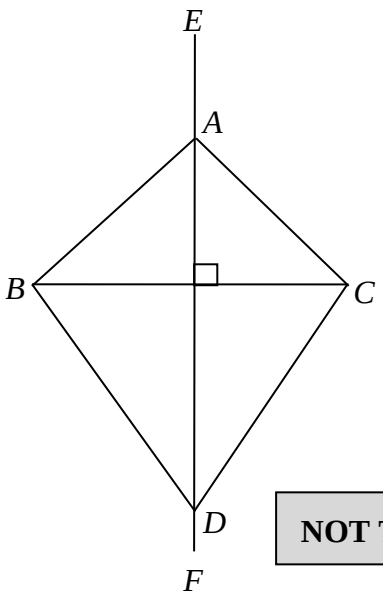
A. 25^o
B. 75^o
C. 105^o
D. 115^o



NOT TO SCALE

34. If *EF* is the right bisector of *BC*, then triangle *ABC* and triangle *DBC* are

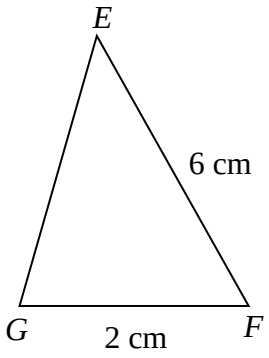
A. scalene triangles.
B. isosceles triangles.
C. equilateral triangles.
D. right angled triangles.



NOT TO SCALE

35. For the given triangle *EFG*, which of the following is TRUE?

A. $\angle F > \angle G$
B. $\angle G > \angle E$
C. $\angle E > \angle F$
D. $\angle G = \angle E + \angle F$



NOT TO SCALE

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

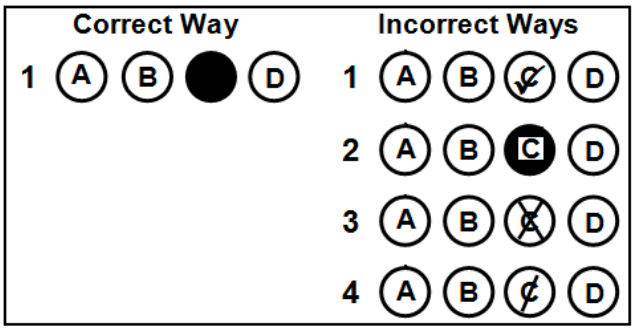
ANNUAL EXAMINATIONS 2021

Mathematics

Time: 1 hour 40 minutes Marks: 50

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. The marks obtained on the 50 MCQs will be equated to the total marks of 75 for the theory examination results.
8. You may use a simple calculator if you wish.

Use the given information to answer Q.1 and Q.2.

It is given that $M = \{0,1,2,3\}$ and $N = \{1,3,4,5\}$.

1. The set $M - N$ is equal to

   A. $\{0\}$.
   B. $\{0,2\}$.
   C. $\{4,5\}$.
   D. $\{1,3\}$.

2. The set $N \cup M$ is equal to

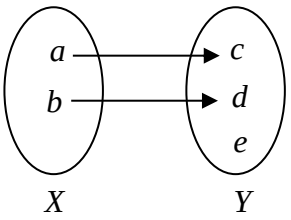
   A. $\{1,3\}$.
   B. $\{0,2,4,5\}$.
   C. $\{0,1,2,3,4,5\}$.
   D. $\{0,1,1,2,3,3,4,5\}$.

3. For the Cartesian product $P \times Q = \{(1,m),(1,3),(4,m),(4,3),(7,m),(7,3)\}$, the number of elements in set Q is

   A. 6
   B. 5
   C. 3
   D. 2

Use the given information to answer Q.4 and Q.5.

A mapping from set X to set Y is given in the diagram.



4. The given mapping shows a/ an

   A. into function only.
   B. one-one function only.
   C. one-one and into function.
   D. one-one and onto function.

5. If the element e is removed from the set Y, then the given mapping will become a/ an

   A. onto function only.
   B. one-one function only.
   C. one-one and into function.
   D. one-one and onto function.

6. If $A = \{1, 2, 3\}$ and $A \cup B = \{1, 2, 3, 4, 5\}$, then the possible set(s) B will be

I. $\{3, 4, 5\}$.
II. $\{1, 3, 5\}$.
III. $\{2, 4, 5\}$.

A. I only
B. II only
C. I and III
D. II and III

7. Consider two sets $A = \{2, 3, 4\}$ and $B = \{a, b\}$. The binary relation $\{(2, b), (3, b), (4, b)\}$ is

A. not a function.
B. an into function.
C. an onto function.
D. an one-one function.

8. If $A = \{a, b\}$ and $B = \{10, 20\}$, then which of the following option(s) is/ are binary relation from A to B?

I. $\{(a, 10), (b, 20)\}$
II. $\{(10, a), (20, b)\}$
III. $\{(a, 20)\}$
IV. $\{(10, b)\}$

A. I only
B. II only
C. I and III
D. II and IV

9. If a universal set is defined as $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ and E is the set of even numbers, then E^C is

A. ϕ.
B. $\{1, 3, 5, 7, 9\}$.
C. $\{2, 4, 6, 8, 10\}$.
D. $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$.

10. If a number 0.0101 can also be expressed as 1.01×10^p, then the value of p is equal to

A. -2
B. -1
C. 1
D. 2

11. On converting $10^{-3} = 0.001$ into the logarithmic form $\log_{10} m = n$, the value of m will be

A. -3
B. 0.001
C. 1
D. 10

12. The value of $\log_x\left(\frac{1}{x^2}\right)$ is equal to

A. -1
B. 1
C. 2
D. -2

13. In a single logarithm, $\log a^2 - 3\log b + \log a$ can be written as

A. $\log\left(\frac{3a}{3b}\right)$.
B. $3\log\left(\frac{a}{b}\right)$.
C. $\log\left(\frac{a^2+a}{b^3}\right)$.
D. $\log(a^2 - 3b + a)$.

14. If $2^{-x} = \frac{1}{16}$, then the value of x is

A. -4
B. $-\frac{1}{4}$
C. $\frac{1}{4}$
D. 4

15. On simplification, $\frac{y^0 \times x}{x^0 \times y}$ is equal to

A. $\frac{x}{y}$
B. $\frac{y}{x}$
C. 1
D. 0

16. If $b-a=2$ and $\frac{1}{2}(b+a)=1$, then the value of b^2-a^2 is equal to

A. 1
B. 4
C. $\frac{1}{2}$
D. $\frac{1}{4}$

17. The value of $(2+4)-\sqrt{4}+\sqrt{2}$ is equal to

A. $4+\sqrt{2}$
B. $4+\sqrt{6}$
C. $6-\sqrt{2}$
D. $6-\sqrt{6}$

18. The value of $\left[\frac{1}{2}(a+x)\right]^3$, when $a=1-x$, is equal to

A. $\frac{1}{6}$
B. $\frac{1}{8}$
C. $\frac{3}{2}$
D. $\frac{3}{8}$

19. One of the examples of polynomial expression is

A. $5\sqrt{x}+5$
B. $3x^3+4x^{\frac{2}{3}}+6$
C. $3x^{-3}+2x^2+3$
D. $5x^3-\frac{4}{3}x^2+\sqrt{3}$

20. On simplification of $\left(\frac{a^2+a^2b}{1-b^2}\right)$, we get

A. $\left(\frac{2a^2}{1-b}\right)$.

B. $\left(\frac{2a^2}{1+b}\right)$.

C. $\left(\frac{a^2}{1-b}\right)$.

D. $\left(\frac{a^2}{1+b}\right)$.

21. The value of $(x-y)\times\left(x^2-xy+y^2\right)$ at $x = 1$ and $y = -1$ is

A. 2
B. 4
C. 5
D. 6

22. On complete factorisation, $3-3p^2$ is equal to

A. $3(1-p)^2$.

B. $3(3-p)^2$.

C. $3(1+p)(1-p)$.

D. $3(3+p)(3-p)$.

23. The expression $r^2-3+6r+12$ can also be written as

A. $(r+3)^2$

B. $(r-3)^2$

C. $(r-3)^2+6^2$

D. $(r+3)^2+6^2$

24. If a polynomial q^3x+q^3+1 is divided by a linear expression, then the remainder is 1. The linear expression must be

A. $x+1$
B. $x-1$
C. $x+q$
D. $x-q$

25. On factorisation of $x(x+2)+1$, we get

A. $x(x+3)$.
B. $2x(x+1)$.
C. $(x+1)(x+1)$.
D. $(x+2)(x+1)$.

26. On complete factorisation of $x+y-(x-y)(x+y)$, we get

A. $(x+y)(x-y)$.
B. $-(x+y)(x-y)$.
C. $(x+y)(1-x-y)$.
D. $(x+y)(1-x+y)$.

27. On complete factorisation of $x^2-2x+2-1$, we get

A. $(x-1)(x-1)$.
B. $(x-1)(x+1)$.
C. $(x-1)(x+2)$.
D. $(x+1)(x-2)$.

28. On factorisation of $b^3-\frac{1}{b^3}$, we get

A. $\left(b-\frac{1}{b}\right)\left(b^2-1+\frac{1}{b^2}\right)$.
B. $\left(b-\frac{1}{b}\right)\left(b^2-1-\frac{1}{b^2}\right)$.
C. $\left(b-\frac{1}{b}\right)\left(b^2+1-\frac{1}{b^2}\right)$.
D. $\left(b-\frac{1}{b}\right)\left(b^2+1+\frac{1}{b^2}\right)$.

29. The polynomial ax^3-x^2-x is divided by $x+1$ and the remainder is 1. The value of *a* will be

A. -3
B. -1
C. 1
D. 3

30. The option which represents one of the zeros of the polynomial $x^3 + 2x^2 - x - 2$ is

A. -1
B. 0
C. 2
D. -3

31. If $R = \begin{bmatrix} a & -b \end{bmatrix}$, then the additive inverse of R is

A. $-\begin{bmatrix} a & b \end{bmatrix}$.
B. $-\begin{bmatrix} a & -b \end{bmatrix}$.
C. $-\begin{bmatrix} -a & b \end{bmatrix}$.
D. $-\begin{bmatrix} -a & -b \end{bmatrix}$.

32. If $N = \begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$, then the transpose of N is

A. $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$.
B. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$.
C. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$.
D. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

Use the given information to answer Q.33, Q.34 and Q.35.

Given that $E = \begin{bmatrix} 0 & -1 \end{bmatrix}$, $F = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$ and $G \times F = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$

33. The order of matrix G

A. is 2×1
B. is 1×2
C. is 2×2
D. cannot be determined

34. The product of matrices E and F, i.e., $E \times F$ is

A. $\begin{bmatrix} -1 \\ -1 \end{bmatrix}$.

B. $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$.

C. $[-2]$.

D. $[0]$.

35. The multiplicative inverse of E^2

A. is $\begin{bmatrix} 0 & 1 \end{bmatrix}$.

B. is $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$.

C. is $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$.

D. does not exist.

36. The matrix $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is a/ an

A. unit matrix.
B. scalar matrix.
C. square matrix.
D. diagonal matrix.

37. If the matrix $\begin{bmatrix} a & -a \\ b & b \end{bmatrix}$ is a singular matrix, then the condition will be

A. $ab = \frac{1}{2}$

B. $ab = 0$

C. $ab = -\frac{1}{2}$

D. $a = -b$

38. If a matrix equation is $3X - \begin{bmatrix} 6 & 3 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, then the matrix X will be

A. $\begin{bmatrix} 2 & 1 \\ 0 & \frac{1}{3} \end{bmatrix}$.

B. $\begin{bmatrix} 3 & 0 \\ -3 & -2 \end{bmatrix}$.

C. $\begin{bmatrix} -9 & -6 \\ -3 & -4 \end{bmatrix}$.

D. $\begin{bmatrix} -2 & -1 \\ 0 & -\frac{1}{3} \end{bmatrix}$.

39. The matrix form of the given simultaneous linear equations $x - 2y = 3$ and $y = -1$, will be

A. $\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$.

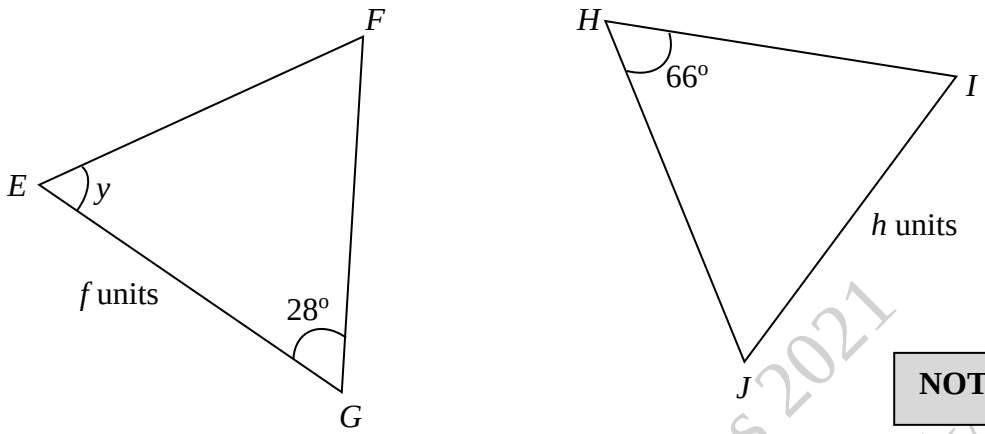
B. $\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$.

C. $\begin{bmatrix} 1 & -2 \\ 1 & 0 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$.

D. $\begin{bmatrix} 1 & -2 \\ 1 & 0 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$.

Use the given information to answer Q.40 and Q.41.

In the given diagram, ΔEFG and ΔHIJ are congruent.



NOT TO SCALE

40. If $\angle E = y$, then the value of y

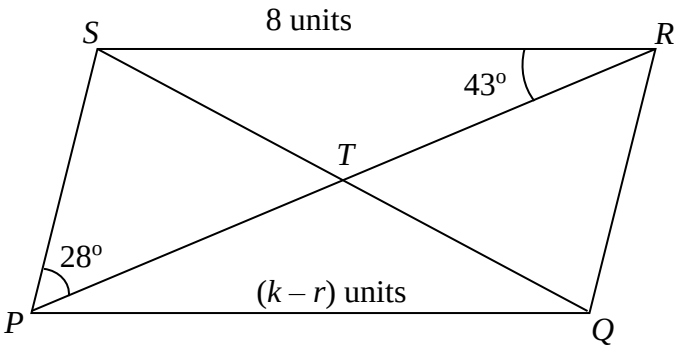
A. is 66^o
B. is 86^o
C. is 94^o
D. cannot be determined

41. The sum of the lengths FG and HJ is

A. $2f$ units.
B. hf units.
C. $2h$ units.
D. $f + h$ units.

Use the given information to answer Q.42 and Q.43.

In the given diagram, *PQRS* is a parallelogram.



NOT TO SCALE

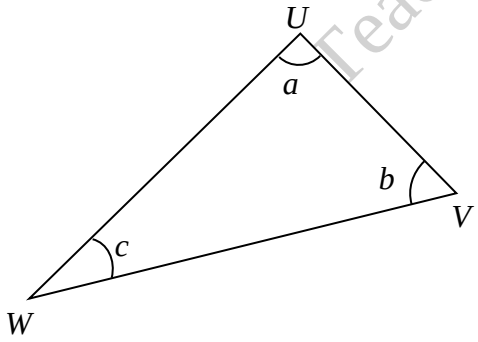
42. If $k = 24$, then the value of r is equal to

A. 3
B. 8
C. 16
D. 32

43. The value of $\angle SRQ$ is equal to

A. 15°
B. 28°
C. 43°
D. 71°

44. In the given triangle, *VW* is the longest side and *UV* is the smallest side.

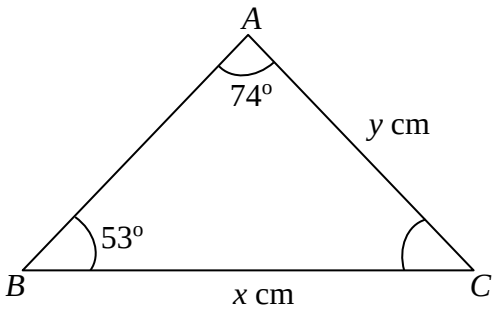


NOT TO SCALE

The CORRECT relationship between the angles is

A. $c > a$
B. $b > a$
C. $a > c$
D. $c > b$

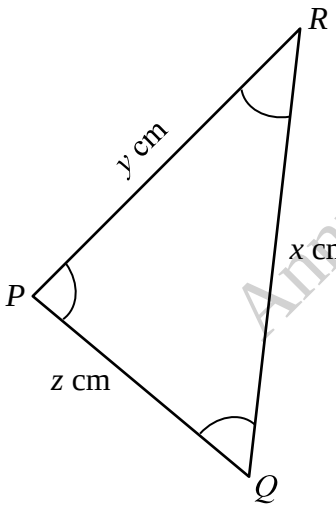
45. For the given triangle *ABC*, the length of side *AB* is

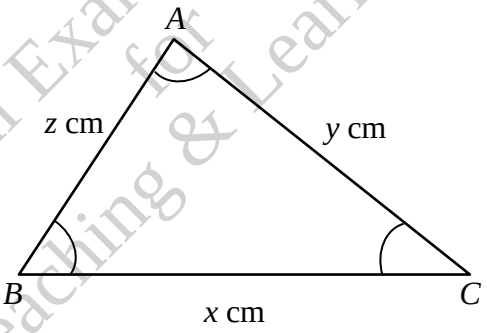


NOT TO SCALE

A. x cm.
B. y cm
C. $x - y$ cm.
D. $x - \frac{y}{2}$ cm.

46. In the correspondence of $\Delta ABC \leftrightarrow \Delta PQR$, If $AB = PQ$, $BC = QR$ and $CA = RP$, then the correct relation between the angles will be

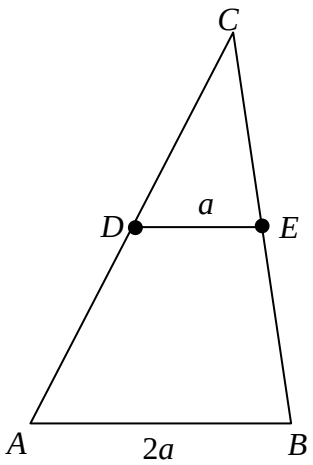




NOT TO SCALE

A. $\angle A = \angle R$.
B. $\angle B = \angle R$.
C. $\angle A = \angle Q$.
D. $\angle B = \angle Q$.

47. In the given triangle *ABC*, *DE* is parallel to *AB*. The CORRECT relation between the sides is

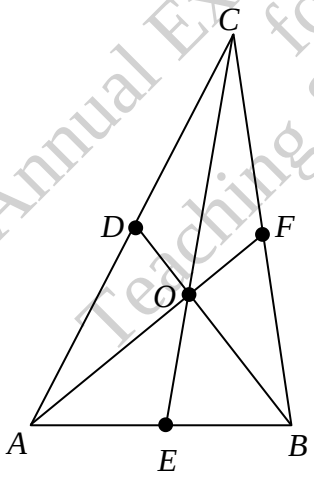


NOT TO SCALE

A. *AC* = *BC*.
B. *AD* = *DC*.
C. *DC* = *EC*.
D. *AC* = 2*BE*.

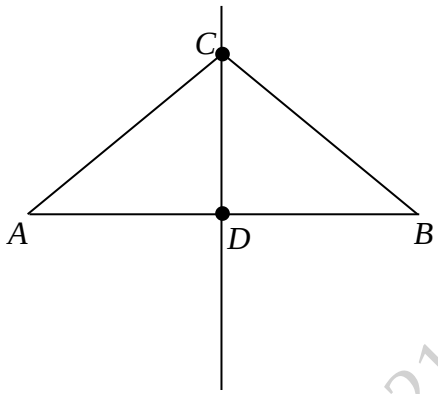
48. In the given triangle *ABC*, the points *D*, *E* and *F* are the midpoints of the sides *AC*, *AB* and *BC* respectively. The line segments *AF*, *BD* and *CE* are the

A. altitudes.
B. medians.
C. right bisectors.
D. angle bisectors.



NOT TO SCALE

49. In the given diagram, AB is a line segment and $AC = BC$.



NOT TO SCALE

The CORRECT relation of AD, BD and $\angle D$ is

A. $AD \neq BD$ and $\angle D \neq 90^o$
B. $AD \neq BD$ and $\angle D = 90^o$
C. $AD = BD$ and $\angle D = 90^o$
D. $AD = BD$ and $\angle D \neq 90^o$

50. The CORRECT measures of the sides of a triangle are

A. 5 cm, 7 cm and 13 cm.
B. 6 cm, 6 cm and 12 cm.
C. 7 cm, 7 cm and 10 cm.
D. 9 cm, 3 cm and 14 cm.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

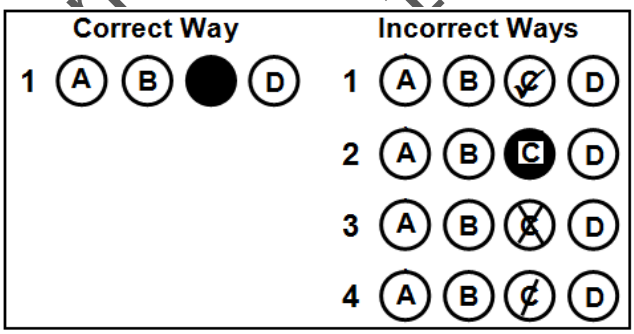
ANNUAL EXAMINATIONS 2022

Mathematics

Time: 1 hour 40 minutes Marks: 50

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. The marks obtained on the 50 MCQs will be equated to the total marks of 75 for the theory examination results.
8. You may use a simple calculator if you wish.

1. If Z, *W*, *N* and *Q* are sets with usual notations, then which of the following statements is CORRECT?

   A. $N \cup Q = N$
   B. $Z \cap Q = Q$
   C. $W \cup Z = Z$
   D. $W \cap N = \phi$

2. For two non-empty sets *A* and *B*, $A \Delta B$ is given by

   A. $(A \cup B) \cup (A \cap B)$.
   B. $(A \cup B) \cap (A \cap B)$.
   C. $(A \cup B) - (A \cap B)$.
   D. $(A \cup B)^c - (A \cap B)^c$.

3. If the points $P(2x+1, 8)$ and $Q(7, 3x-1)$ have the same abscissa, then the value of the ordinate of *Q* will be

   A. 2
   B. 5
   C. 7
   D. 8

4. The CORRECT statement for the distributive property of union over intersection is

   A. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
   B. $A \cup (B \cap C) = (A \cup B) \cup (A \cup C)$.
   C. $A \cap (B \cup C) = (A \cap B) \cap (A \cap C)$.
   D. $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

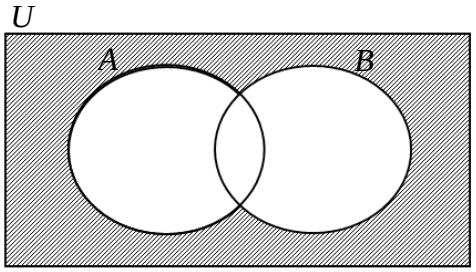
5. If $U = \{a, b, c, d, e, f, g, h\}$ and $A^c \cup B^c = \{a, b, g, h\}$, then $A \cap B$ is equal to

   A. $\{\}$.
   B. $\{c, d, e, f\}$.
   C. $\{a, b, g, h\}$.
   D. $\{a, b, c, d, e, f, g, h\}$.

6. The given Venn diagram represents

   I. $A^c \cup B^c$
   II. $A^c \cap B^c$
   III. $(A \cup B)^c$

   A. I only.
   B. II only.
   C. I and III.
   D. II and III.



7. For two non-empty sets A and B, $A \cap B = \{2,4,6\}$ and $A \Delta B = \{1,3\}$, the set $A \cup B$ is

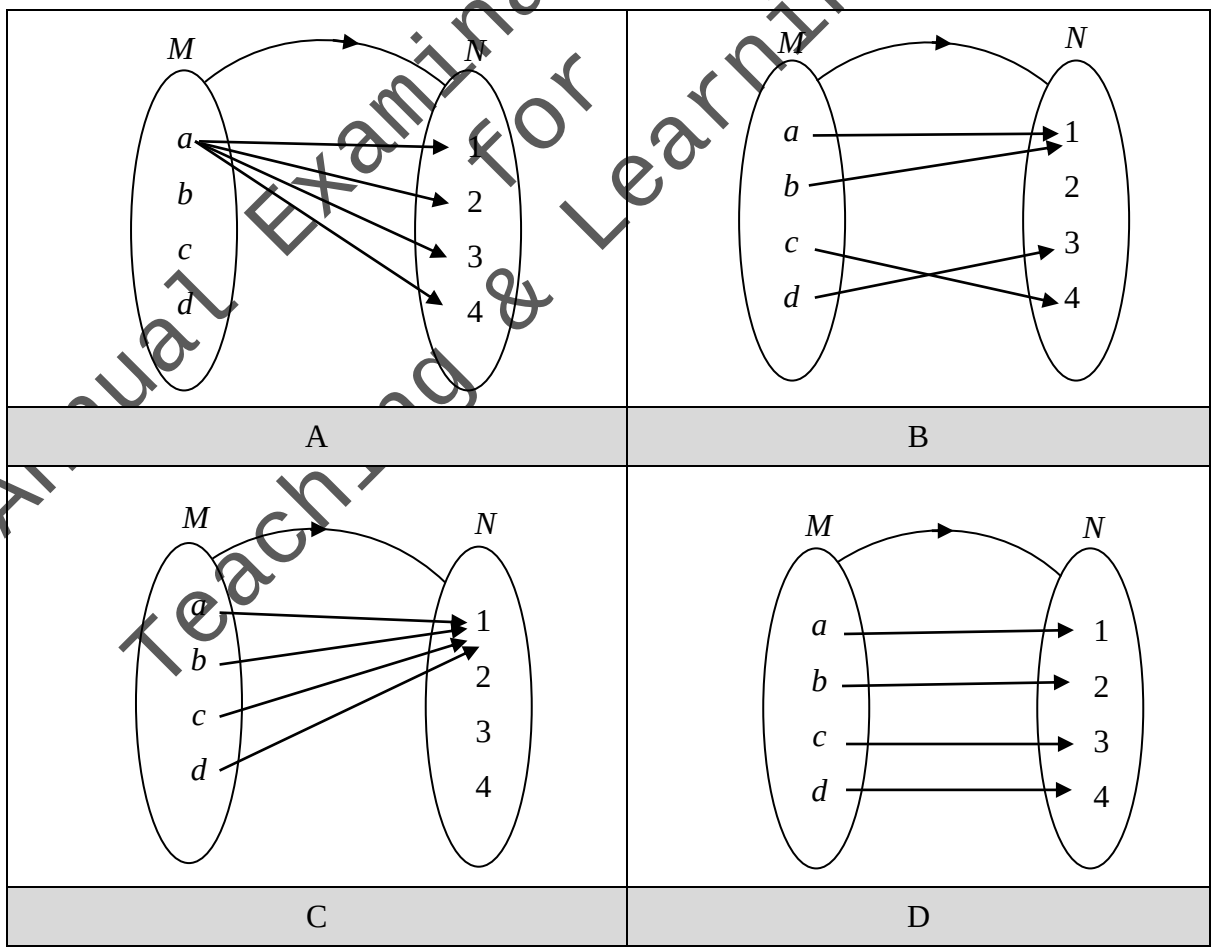
   A. ϕ.
   B. $\{1,3\}$.
   C. $\{2,4,6\}$.
   D. $\{1,2,3,4,6\}$.

8. It is given that X = {1, 2, 3, 4} and Y = {a, b, c}. If a relation from X to Y is defined as f = {(1, a), (2, b), (3, c)}, then f is a/ an

   I. binary relation
   II. into function
   III. one-one function

   A. I only.
   B. III only.
   C. I and II.
   D. I and III.

9. Which of the following diagrams DOES NOT represent a function from M to N?



10. Common notation of the number 1.0034216×10^6 is

A. 0.00000010034216
B. 0.0000010034216
C. 1003421.6
D. 10034216

11. If $\log_a 125 = -3$, then the value of *a* is

A. -5
B. $-\frac{1}{5}$
C. $\frac{1}{5}$
D. 5

12. In single logarithm, the expression $\log 3x - \log x^2 + \log(x - y)$ will be equal to

A. $\log(4x - x^2 - y)$.
B. $\log 3x^3(x - y)$.
C. $\log \frac{3x - x^2}{x - y}$.
D. $\log \frac{3x(x - y)}{x^2}$.

13. The logarithmic form of $\left(\frac{1}{9}\right)^{\frac{1}{2}} = \frac{1}{3}$ is

A. $\log_{\frac{1}{2}} \frac{1}{9} = \frac{1}{3}$
B. $\log_{\frac{1}{9}} \frac{1}{3} = \frac{1}{2}$
C. $\log_{\frac{1}{3}} \frac{1}{9} = \frac{1}{2}$
D. $\log_{\frac{1}{9}} \frac{1}{2} = \frac{1}{3}$

14. If $\log 2 = 0.30103$ and $\log 5 = 0.69897$, then the value of $\log \frac{32}{10}$ is

A. -3.78235
B. 0.50515
C. 1.50515
D. 1.10721

15. In the given table, the CORRECT option that has a rational expression and a polynomial is

	Rational Expression	Polynomial
A	$\sqrt{2x^2+1}$	$\frac{1}{2x^2+1}$
B	$\frac{1}{2x^2+1}$	$2x^2+1$
C	$2x^2+\frac{1}{\sqrt{x}}$	$2x^2+\frac{1}{x}$
D	$2x^2+\frac{1}{x}$	$2x^2+\frac{1}{\sqrt{x}}$

16. The product of the rational expressions $\frac{12a}{5}$ and $\frac{a^3b^4}{a^4\times 4b^2}$ is

A. $\frac{5b^2}{48a^2}$.

B. $\frac{48a^2}{5b^2}$.

C. $\frac{3b^2}{5}$.

D. $\frac{b^2}{4a}$.

17. The value of a in the expression $\frac{b-2c}{a}=d$, for $b=3$, $d=5$ and $c=-1$, will be

A. 0

B. $\frac{1}{5}$

C. 1

D. 5

18. The value of $\frac{1}{a^3}-a^3$ for $a-\frac{1}{a}=1$ is

A. -4

B. -1

C. 1

D. 4

19. The simplest form of the sum of $\sqrt{a-2}$, $\sqrt{a}$ and $\sqrt{a-1}$ is

(**Note**: $a-2$, $a-1$ are non-negative)

A. $\sqrt{3a-3}$
B. $\sqrt{3a}-3$
C. $3\sqrt{a}-3$
D. $\sqrt{a-2}+\sqrt{a}+\sqrt{a-1}$

20. The product of $a-1$, a^3+1 and a^2+a+1 is

A. $(a^3+1)^2$
B. $(a^3-1)^2$
C. a^6-1
D. a^6+1

21. If $s^2+(-2t)^2+\left(u^2\right)^2=16$ and $su^2-2st-2tu^3=10$, then the value of $\left(s-2t+u^2\right)^2$ will be

A. $\sqrt{26}$
B. 6
C. 26
D. 36

22. The expression $(x-3)^2-2(3-x)+(x-3)$ is equal to the product

A. $-(x-3)$.
B. $x(x-3)$.
C. $(x+4)(x-3)$.
D. $(x-4)(x-3)$.

23. The completely factorised form of $5+50r+125r^2$ is

A. $(1+5r)^2$.
B. $(5+25r)^2$.
C. $5(1+5r)^2$.
D. $5(5+10r+25r^2)$.

24. On factorising the polynomial $p^2-(h^2-2h+1)$, we get

A. $(p+h-1)(p-h-1)$.
B. $(p+h-1)(p-h+1)$.
C. $(p+h+1)(p-h-1)$.
D. $(p-h+1)(p+h+1)$.

25. One of the zeros of the polynomial $p(x) = 2x^3 - x - 1$ is

A. -1
B. 0
C. 1
D. 2

26. One of the factors of the polynomial $p(x) = x^3 - 2x + 1$ is

A. $x - 2$
B. $x - 1$
C. $x + 1$
D. $x + 2$

27. The factorised form of the expression $\frac{1}{27} + 27a^3$ will be

A. $\left(3a + \frac{1}{3}\right)\left(9a^2 + a + \frac{1}{9}\right)$.
B. $\left(3a + \frac{1}{3}\right)\left(9a^2 - a + \frac{1}{9}\right)$.
C. $3\left(a + \frac{1}{3}\right)\left(9a^2 - a + \frac{1}{9}\right)$.
D. $3\left(a + \frac{1}{3}\right)\left(9a^2 + a + \frac{1}{9}\right)$.

28. On factorising the polynomial $1 + 4c^4$, we get

A. $(2c^2 + 2c + 1)(2c^2 - 2c + 1)$.
B. $(2c^2 - 2c + 1)(2c^2 - 2c + 1)$.
C. $(2c^2 + 2c - 1)(2c^2 - 2c + 1)$.
D. $(2c^2 + 2c + 1)(2c^2 - 2c - 1)$.

29. If $x - 1$ is a factor of the polynomial $p(x) = x^3 - ax^2 + 1$, then the value of a will be

A. -2
B. -1
C. 1
D. 2

30. To factorise the expression $(x-2)(x-1)(x+2)(x+3)+15$, the option(s) for the essential arrangement(s) is/ are

I. $(x-1)(x-2)$ and $(x+2)(x+3)$
II. $(x-1)(x+2)$ and $(x-2)(x+3)$
III. $(x-1)(x+3)$ and $(x-2)(x+3)$

A. I only.
B. II only.
C. I and III.
D. II and III.

31. The matrix $\begin{bmatrix} 5 & 0 \\ 0 & -5 \end{bmatrix}$ is a/ an

I. diagonal matrix.
II. symmetric matrix.
III. identity matrix.

A. I only
B. II only
C. I and II
D. I and III

32. If the additive inverse of the matrix $\begin{bmatrix} -a & 5 \\ 0 & 0 \end{bmatrix}$ is $\begin{bmatrix} -3 & -5 \\ 0 & 0 \end{bmatrix}$, then the value of a is

A. -5
B. -3
C. 3
D. 5

33. If $A=\begin{bmatrix} 1 & 0 \\ 2 & 0 \end{bmatrix}$, $B=\begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $C=\begin{bmatrix} 0 & 2 \end{bmatrix}$, then the possible product(s) is/ are

I. $A \times B$
II. $A \times C$
III. $B \times A$

A. I only.
B. II only.
C. I and II.
D. II and III.

34. The determinant of the matrix $A = \begin{bmatrix} a & -a \\ 1 & 0 \end{bmatrix}$ is

A. $-a$
B. 0
C. a
D. $2a$

35. The adjoint of the matrix $W = \begin{bmatrix} -1 & -a \\ 0 & 1 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & 0 \\ a & -1 \end{bmatrix}$.

B. $\begin{bmatrix} 1 & a \\ 0 & -1 \end{bmatrix}$.

C. $\begin{bmatrix} -1 & a \\ 0 & 1 \end{bmatrix}$.

D. $\begin{bmatrix} 1 & -a \\ 0 & -1 \end{bmatrix}$.

36. The matrix form of the simultaneous linear equations $1 - x + y = 0$ and $x - 3 = 0$ is

A. $\begin{bmatrix} 1 & -1 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$.

B. $\begin{bmatrix} -1 & 1 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$.

C. $\begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$.

D. $\begin{bmatrix} 1 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$.

37. Using Crammer's rule, the value of y for $x+y=1$ and $x-y=3$ is

A. $\begin{vmatrix} 1 & 1 \\ 1 & 3 \end{vmatrix}$.

B. $\dfrac{\begin{vmatrix} 1 & 1 \\ 1 & 3 \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix}}$.

C. $\begin{vmatrix} 1 & 1 \\ 3 & -1 \end{vmatrix}$.

D. $\dfrac{\begin{vmatrix} 1 & 1 \\ 3 & -1 \end{vmatrix}}{\begin{vmatrix} 1 & 1 \\ 1 & -1 \end{vmatrix}}$.

38. X and Y are two square matrices such that $XY=YX=I$. If I is the identity matrix, then X and Y are

A. multiplicative inverses of each other.
B. additive inverses of each other.
C. transpose of each other.
D. singular matrices.

39. The multiplicative inverse of the matrix $\begin{bmatrix} 2 & 6 \\ -1 & -3 \end{bmatrix}$

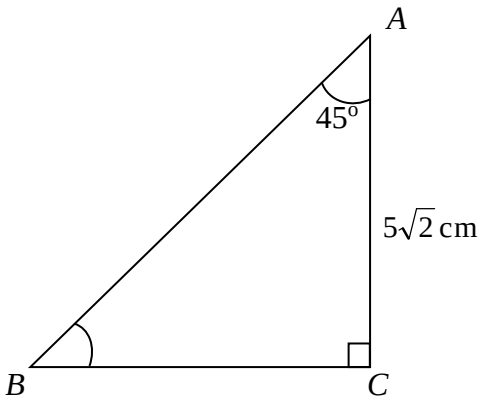
A. is $\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$.

B. is $-\dfrac{1}{12}\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$.

C. is $\dfrac{1}{12}\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$.

D. does not exist.

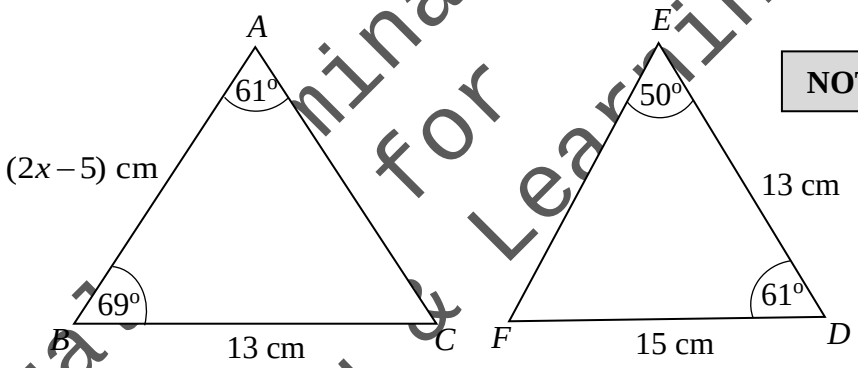
40. In the triangle *ABC*, the length of BC is



NOT TO SCALE

A. 5 cm.
B. 6 cm.
C. 10 cm.
D. $5\sqrt{2}$ cm.

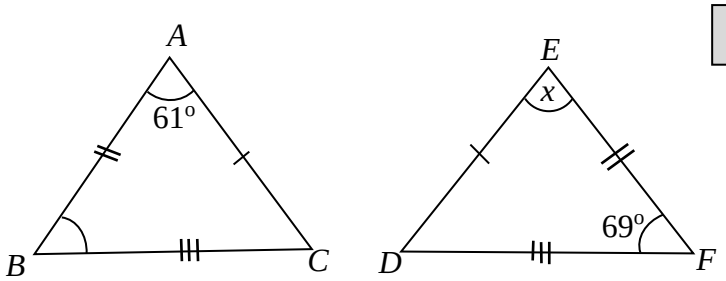
41. In the given correspondence $\Delta ABC \leftrightarrow \Delta DFE$, if $\Delta ABC \cong \Delta DFE$, then the value of x is



NOT TO SCALE

A. 4
B. 5
C. 9
D. 10

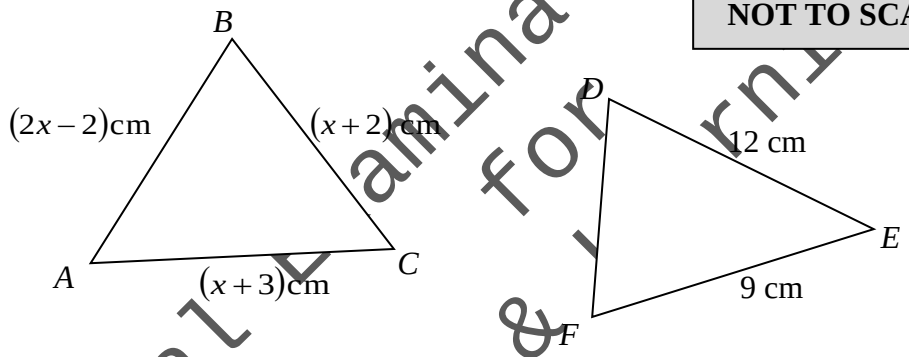
42. In the given correspondence $\Delta ABC \leftrightarrow \Delta EFD$, $AB = EF$, $BC = FD$ and $\angle ABC = \angle EFD$. In the given conditions, the value of x is



NOT TO SCALE

A. 50^o
B. 61^o
C. 69^o
D. 119^o

43. In the given correspondence $\Delta ABC \leftrightarrow \Delta DEF$, if $\Delta ABC \cong \Delta DEF$, then the length of DF is

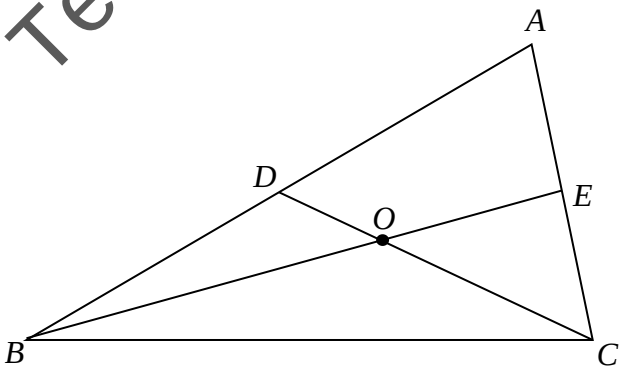


NOT TO SCALE

A. 6 cm.
B. 7 cm.
C. 10 cm.
D. 14 cm.

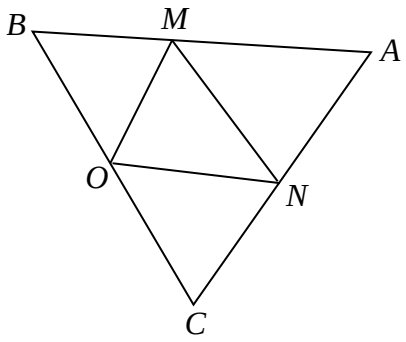
44. In the given triangle ABC, CD and BE are the medians of the triangle intersecting at point O. If $OB = 6\,\text{cm}$ and $OE = (x-1)\,\text{cm}$, then the value of x will be

A. 3
B. 4
C. 6
D. 7



NOT TO SCALE

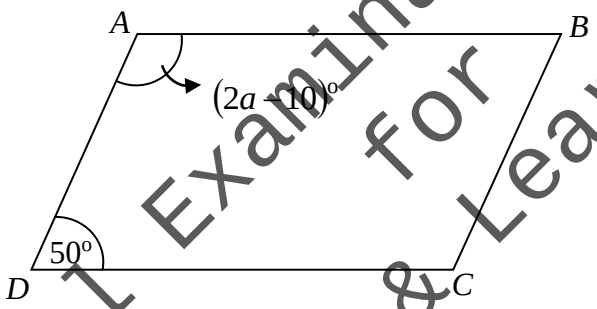
45. In the given triangle *ABC*, *M* and *N* are the midpoints of the sides *AB* and *AC* respectively. If $BC = 14\,\text{cm}$ and $MN = (2x-1)\,\text{cm}$, then the value of *x* will be



NOT TO SCALE

A. 3 cm.
B. 4 cm.
C. 7 cm.
D. 7.5 cm.

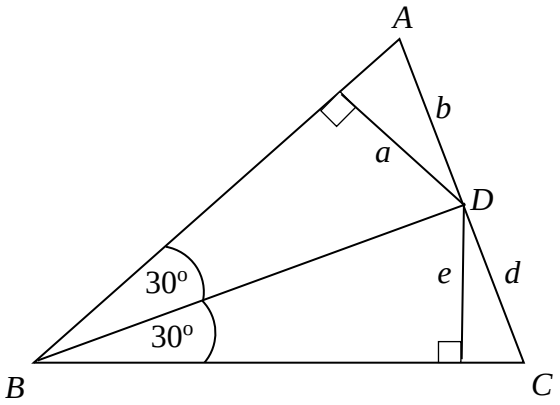
46. In the given parallelogram *ABCD*, the value of *a* is



NOT TO SCALE

A. 30
B. 60
C. 70
D. 130

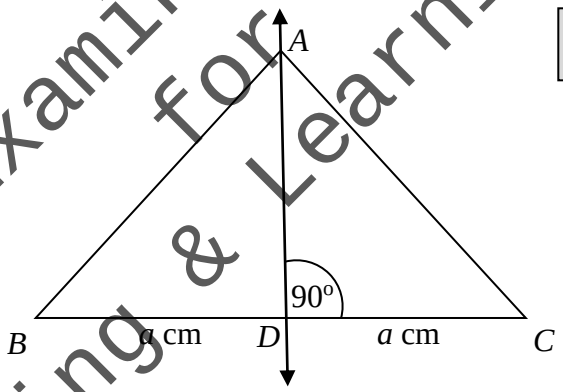
47. In the given diagram, the CORRECT relation between the lengths represented by *a*, *b*, *d* and *e* is



NOT TO SCALE

A. $a = e$.
B. $a = d$.
C. $b = d$.
D. $b = e$.

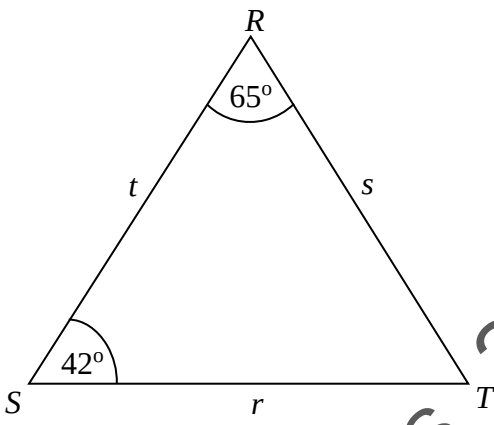
48. In the given diagram, the CORRECT relation between the lengths is



NOT TO SCALE

A. $AB = AD$.
B. $AB = AC$.
C. $BC = AB$.
D. $AC = DC$.

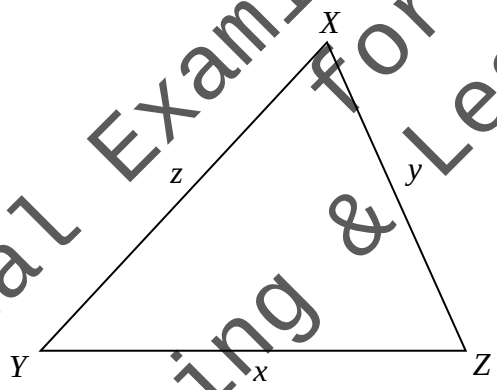
49. In the given triangle *RST*, if the sides are represented as *r*, *s* and *t*, then which of the following statements is FALSE about these sides of the triangle?



NOT TO SCALE

A. $t > s$
B. $t > r$
C. $s > r$
D. $t > r > s$

50. In the given triangle *XYZ*, the possible values of *x*, *y* and *z* respectively would be



NOT TO SCALE

A. 5 cm, 5 cm and 10 cm.
B. 5 cm, 6 cm and 12 cm.
C. 3 cm, 1 cm and 5 cm.
D. 7 cm, 7 cm and 13 cm.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

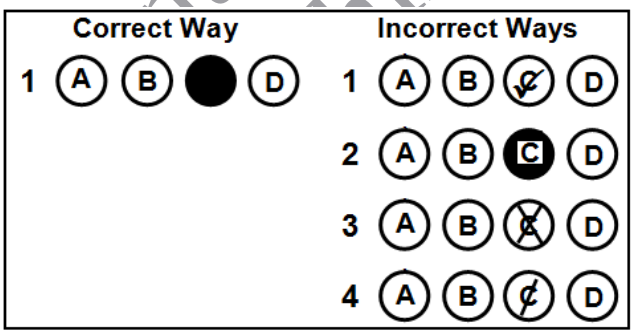
ANNUAL EXAMINATIONS (THEORY) 2023

Mathematics Paper I

Time: 1 hour 20 minutes Marks: 45

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 45 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

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7. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
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List of Formulae

Note:

- All symbols used in the formulae have their usual meaning.

Sets and Functions

$A\Delta B = (A \cup B) - (A \cap B)$ $\quad (A \cap B)^c = A^c \cup B^c$ $\quad (A \cup B)^c = A^c \cap B^c$

Real and Complex Numbers

$x^m \times x^n = x^{m+n}$ $\quad (x \times y)^n = x^n \times y^n$ $\quad (x^m)^n = x^{mn}$

$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$ $\quad \frac{x^m}{x^n} = x^{m-n}$ $\quad a^{-m} = \frac{1}{a^m}$

Exponents and Logarithms

$\log_a(m \times n) = \log_a m + \log_a n$ $\quad \log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$ $\quad \log_a b = n \Leftrightarrow a^n = b$

$\log_a(m)^n = n \log_a m$ $\quad \log_a n = \log_b n \times \log_a b$ $\quad \log_a n = \frac{\log_b n}{\log_b a}$

Algebraic Formulae & Applications and Factorisation

$(a-b)^2 = a^2 - 2ab + b^2$ $\quad (a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ $\quad a^2 - b^2 = (a+b)(a-b)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ $\quad (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$ $\quad (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $\quad (a+b)^2 - (a-b)^2 = 4ab$

Matrices and Determinants

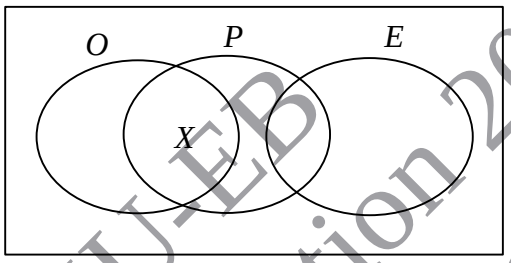
$A^{-1} = \frac{1}{|A|} AdjA$

1. If $A = \{1, 2, 3\}$ and $A \cup B = \{1, 2, 3, 4, 5\}$, then the possible set(s) represented by B could be

   I. $\{3, 4, 5\}$
   II. $\{1, 3, 5\}$
   III. $\{4, 5\}$

   A. I only.
   B. II only.
   C. I and III.
   D. II and III.

2. There are 10 balls in a bag. The balls are numbered as 1 to 10. Aman wants to separate the balls in three sets of even (E), odd (O) and prime (P) numbers as shown in the given Venn diagram.



   The overlapping region between O and P, represented as X, will contain the balls numbered as

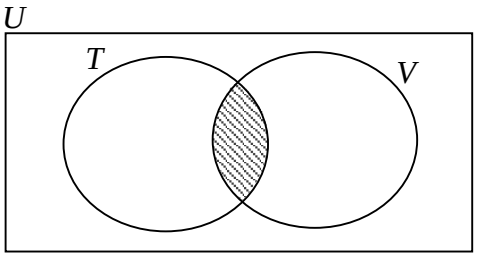
   A. $\{1, 2, 3, 5, 7, 9\}$.
   B. $\{3, 5, 7, 9\}$.
   C. $\{2, 3, 5, 7\}$.
   D. $\{3, 5, 7\}$.

3. If M, N and Q are any non-empty sets, then $M \cup (N \cap Q)$ is equal to

   A. $(M \cap N) \cap (M \cap Q)$.
   B. $(M \cup N) \cup (M \cup Q)$.
   C. $(M \cap N) \cup (M \cap Q)$.
   D. $(M \cup N) \cap (M \cup Q)$.

4. The shaded region in the given Venn diagram shows

   A. $T \cup V$.
   B. $T \cap V$.
   C. $T^c \cup V^c$.
   D. $T^c \cap V^c$.



5. If $A \times B = \{(1, a), (1, b), (1, c), (4, a), (4, b), (4, c)\}$, then the number of elements in set A must be

   A. 2
   B. 3
   C. 5
   D. 6

6. If $A = \{0, 1, 2, 3\}$ and $B = \{(0, 4)\}$, then one of the binary relations from A to B will be

   A. $\{((0, 4), 0)\}$.
   B. $\{(0, (0, 4))\}$.
   C. $\{(0, 0), (0, 4)\}$.
   D. $\{(0, 0), (0, 1), (0, 2)\}$.

7. Which of the given numbers is/ are rational number(s)?

   I. 5.38356125
   II. 5.234523452345…
   III. 5.32112345145143652…

   A. II only
   B. III only
   C. I and II
   D. II and III

8. The radical form of $\left(2^3 \times 3\right)^{\frac{1}{3}}$ will be

   A. $\sqrt[3]{18}$
   B. $8 \times \sqrt[3]{3}$
   C. $2 \times \sqrt[3]{3}$
   D. $3 \times \sqrt[3]{8}$

9. The simplest form of $\frac{a^n \times a^{-3n}}{a^{2n}}$ will be

   A. a^{-4n}
   B. $a^{-\frac{3n}{2}}$
   C. -1
   D. a^{4n}

10. If $z_1 = -2i$ and $z_2 = 5i$ are two complex numbers, then their product will be

A. -10
B. $-3i$
C. $10i$
D. 10

11. The number $1{,}000{,}000$ can be expressed in scientific notation as

A. 1×10^{6}
B. 1×10^{5}
C. 10×10^{6}
D. 10×10^{7}

12. The value of a in the logarithmic equation $\log_2 \sqrt{a} = 3$ will be

A. $2\sqrt{2}$
B. $3\sqrt{2}$
C. 8
D. 64

13. The expression $\log \frac{x-y}{z}$ can be expressed in the form

A. $\log x - \log y - \log z.$
B. $\log x + \log y - \log z.$
C. $\log(x-y) - \log z.$
D. $\log(x-y) + \log z.$

14. The value of the logarithmic expression $1 + \log_2 32 - \log_2 \frac{1}{8}$ will be

A. 9
B. 8
C. 3
D. 2

15. The expression $\log \sqrt[3]{9}$ is equal to

A. $\frac{1}{6}\log 9$

B. $\frac{2}{3}\log 9$

C. $\frac{2}{3}\log 3$

D. $\frac{3}{2}\log 3$

16. An algebraic expression $2x^n + 3y^m - z^p$ is a polynomial if the values of *m*, *n* and *p* belong to the set of

A. integers.
B. rational numbers.
C. non-negative integers.
D. positive real numbers.

17. The value of $(x-y)\times(x^2 - xy + y^2)$ at $x = 1$ and $y = -1$ will be

A. 2
B. 4
C. 5
D. 6

18. If the value of $(a+b)^2 = 144$ and $ab = 35$, then the value of $a - b$ will be

A. ± 2
B. ± 12
C. $\pm\sqrt{74}$
D. $\pm\sqrt{109}$

19. If $a + \frac{1}{a} = 2$, then $a^3 + \frac{1}{a^3}$ will be equal to

A. -8
B. -2
C. 2
D. 8

20. On simplification of $2\sqrt{27}+2\sqrt{12}$, we get

A. $8\sqrt{3}$
B. $10\sqrt{3}$
C. $2\sqrt{39}$
D. $4\sqrt{39}$

21. The product of $a-1$, a^3-1 and a^2+a+1 will be

A. $\left(a^3+1\right)^2$
B. $\left(a^3-1\right)^2$
C. a^6-1
D. a^6+1

22. The complete factorised form of the expression $x+y-(x-y)(x+y)$ will be

A. $-(x+y)(x-y).$
B. $(x+y)(x-y).$
C. $(x+y)(1-x-y).$
D. $(x+y)(1-x+y).$

23. The expression $\frac{1}{p^4}+\frac{2}{p^2}+1$ can be expressed as

A. $\left(1+\frac{1}{p^2}\right)^2.$
B. $\left(1-\frac{1}{p^2}\right)^2.$
C. $\left(1+\frac{1}{p}+\frac{1}{p^2}\right)\times\left(1-\frac{1}{p}+\frac{1}{p^2}\right).$
D. $\left(1+\frac{1}{p}+\frac{1}{p^2}\right)\times\left(1+\frac{1}{p}-\frac{1}{p^2}\right).$

24. On factorisation of $x^2-(2x-1)$, we get

A. $(x-1)(x-1)$
B. $(x-1)(x+1)$
C. $x(x-2)+1$
D. $x(x-2)-1$

25. The expression t^3-3t^2+3t-1 is equal to

A. $(t-1)^3$
B. $(1-t)^3$
C. $1-t^3$
D. t^3-1

26. All of the given options are the zeros of the polynomial $p(y)=y(y-1)(y-2)(y+4)$ EXCEPT

A. 0
B. 1
C. 2
D. 4

27. The polynomial $p(a)=a^2-3a+1$ divided by a linear divisor leaves -1 as remainder. One of the linear divisor in this case is

A. $a-3$
B. $a-1$
C. $a+1$
D. $a+2$

28. Applying the factor theorem, one of the factors of the polynomial $p(t)=t^3-t^2-t+1$ is

A. t
B. $t-2$
C. $t+1$
D. $t+2$

29. The value of x for 7 : 6 :: 21 : x is

A. 2
B. 3
C. 18
D. 20

30. The mean proportions between 3 and 12 are

A. ± 6
B. ± 9
C. ± 12
D. ± 36

31. If *s* is inversely proportional to *t*, then the missing value of *s* in the given table will be

s	5	?
t	12	24

A. 2.5
B. 7.5
C. 10
D. 17

32. If $a : b :: c : d$, then $\frac{a+b}{a-b} = \frac{c+d}{c-d}$. This is the statement of

A. dividendo theorem.
B. alternendo theorem.
C. componendo theorem.
D. componendo dividendo theorem.

33. The order of the matrix $\begin{bmatrix} 5 & 6 & 1 & 0 \end{bmatrix}$ is

A. 1×3
B. 1×4
C. 3×1
D. 4×1

34. The matrix $\begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is a

I. null matrix
II. square matrix
III. symmetric matrix

A. I only.
B. II only.
C. I and III.
D. II and III.

35. The matrix $\begin{bmatrix} 0 & -b \\ 0 & -4 \end{bmatrix}$ is the additive inverse of the matrix

A. $\begin{bmatrix} b & 0 \\ 4 & 0 \end{bmatrix}$.

B. $\begin{bmatrix} 0 & b \\ 0 & 4 \end{bmatrix}$.

C. $\begin{bmatrix} -b & 0 \\ 4 & 0 \end{bmatrix}$.

D. $\begin{bmatrix} 0 & b \\ 0 & -4 \end{bmatrix}$.

36. The product of $A = \begin{bmatrix} a & -b \\ 1 & 1 \end{bmatrix}$ and an unknown matrix B is $AB = I$, where I is the identity matrix of order 2×2. The matrix B would be

A. $\frac{1}{a+b}\begin{bmatrix} 1 & b \\ -1 & a \end{bmatrix}$.

B. $\frac{1}{a-b}\begin{bmatrix} 1 & b \\ -1 & a \end{bmatrix}$.

C. $\frac{1}{a-b}\begin{bmatrix} -a & 1 \\ -b & -1 \end{bmatrix}$.

D. $\frac{1}{a+b}\begin{bmatrix} -a & 1 \\ -b & -1 \end{bmatrix}$.

37. If the matrix $\begin{bmatrix} a & -a \\ b & b \end{bmatrix}$ is a singular matrix, then a and b are related as

A. $ab = \frac{1}{2}$.

B. $ab = 0$.

C. $a = -b$.

D. $ab = -\frac{1}{2}$.

38. On solving the matrix equation $\begin{bmatrix} 1 & 2 \\ 1 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$ by Crammer's rule, the value of x can be represented as

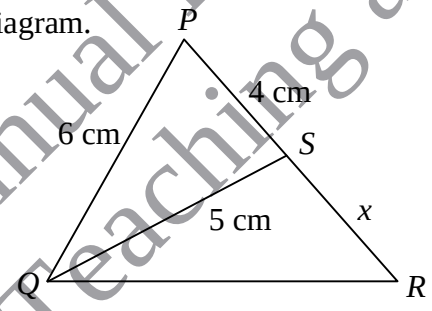
A. $\dfrac{\begin{vmatrix} 3 & 2 \\ -1 & -1 \end{vmatrix}}{\begin{vmatrix} 1 & 2 \\ 1 & -1 \end{vmatrix}}$.

B. $\dfrac{\begin{vmatrix} 1 & 2 \\ 1 & -1 \end{vmatrix}}{\begin{vmatrix} 3 & 2 \\ -1 & -1 \end{vmatrix}}$.

C. $\dfrac{\begin{vmatrix} 2 & 3 \\ -1 & -1 \end{vmatrix}}{\begin{vmatrix} 1 & 2 \\ 1 & -1 \end{vmatrix}}$.

D. $\dfrac{\begin{vmatrix} 1 & 2 \\ 1 & -1 \end{vmatrix}}{\begin{vmatrix} 2 & 3 \\ -1 & -1 \end{vmatrix}}$.

39. In the correspondence of $\Delta PQS \leftrightarrow \Delta RQS$, $PQ = QR$ and $\angle PQS = \angle SQR$, as shown in the given diagram.

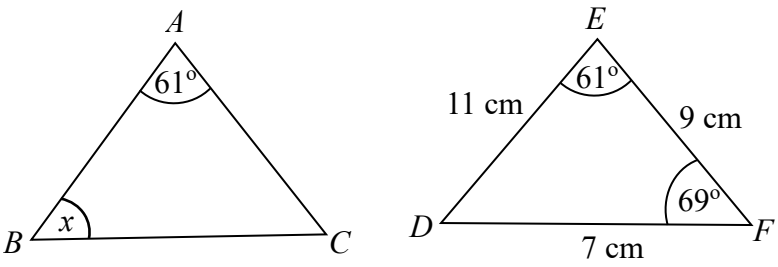


NOT TO SCALE

The value of x will be

A. 4 cm.
B. 5 cm.
C. 6 cm.
D. 11 cm.

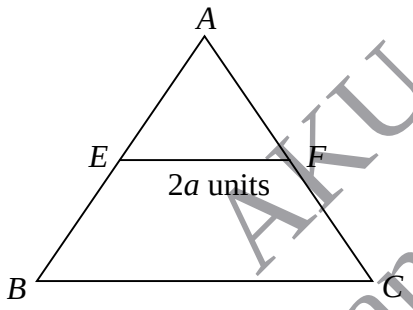
40. In the correspondence $\Delta ABC \leftrightarrow \Delta EFD$, if $\Delta ABC \cong \Delta EFD$, then the value of x will be



NOT TO SCALE

A. 50°
B. 61°
C. 69°
D. 119°

41. Consider the triangle ABC such that E and F are the midpoints of the sides AB and AC respectively.

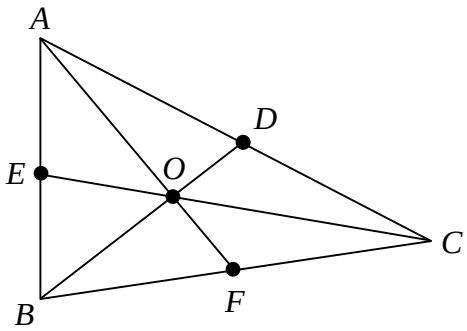


NOT TO SCALE

The length of BC would be

A. $\frac{1}{2}a$ units .
B. a unit.
C. $2a$ units.
D. $4a$ units.

42. In the given triangle *ABC*, the points *D*, *E* and *F* are the midpoints of the sides *AC*, *AB* and *BC* respectively.

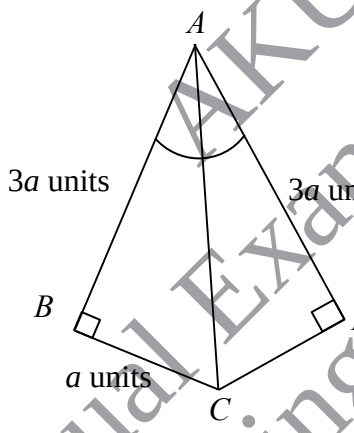


NOT TO SCALE

The line segments *AF*, *BD* and *CE* are the

A. altitudes.
B. medians.
C. right bisectors.
D. angle bisectors.

43. In the given figure, *AC* is the angle bisector of angle $\angle BAD$.

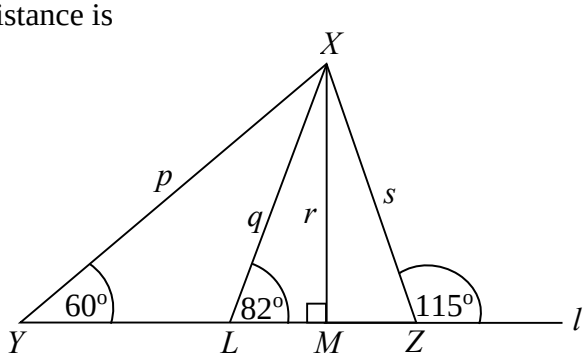


NOT TO SCALE

If *BC* = *a* units, then the length of *CD* will be

A. $\frac{1}{2}a$ units.
B. *a* units.
C. 2*a* units.
D. 3*a* units.

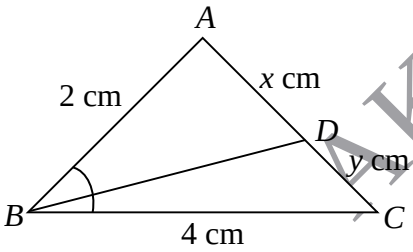
44. In the given diagram, if p, q, r and s are distances of point X from the line l, then the shortest distance is



NOT TO SCALE

A. p.
B. q.
C. r.
D. s.

45. If BD is the bisector of $\angle ABC$, then the ratio $x : y$ is



NOT TO SCALE

A. 1:1
B. 1:2
C. 1:4
D. 2:1

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

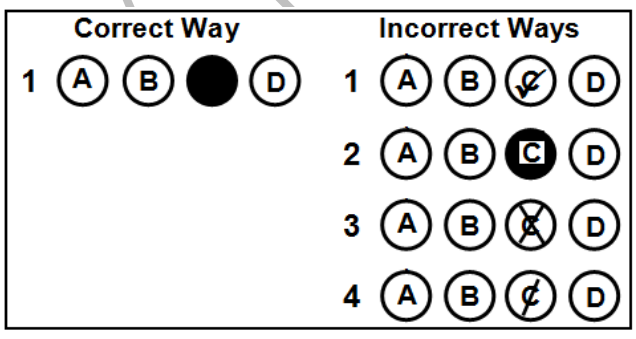
ANNUAL EXAMINATIONS (THEORY) 2024

Mathematics Paper I

Time: 1 hour 20 minutes Marks: 45

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 45 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

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$\log_a (m)^n = n \log_a m$ $\quad \log_a n = \log_b n \times \log_a b$ $\quad \log_a n = \frac{\log_b n}{\log_b a}$

Algebraic Formulae & Applications and Factorisation

$(a-b)^2 = a^2 - 2ab + b^2$ $\quad (a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$ $\quad a^2 - b^2 = (a+b)(a-b)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ $\quad (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$ $\quad (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $\quad (a+b)^2 - (a-b)^2 = 4ab$

Matrices and Determinants

$A^{-1} = \frac{1}{|A|} AdjA$

1. If A and B are two non-empty sets, then $A \cap B$ will contain

   A. the common elements of set A and set B.
   B. all of the elements in set A and set B.
   C. the elements in set A but not in set B.
   D. the elements in set B but not in set A.

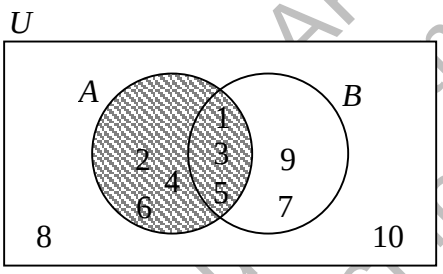
2. It is given that $M = \{0,1,2,3\}$ and $N = \{1,3,4,5\}$. The set $M - N$ is equal to

   A. $\{0\}$.
   B. $\{0, 2\}$.
   C. $\{4, 5\}$.
   D. $\{1, 3\}$.

3. If M, N and P are three non-empty sets, then the associative property of intersection will be

   A. $(M \cap N) \cap (M \cap P) = (M \cap P) \cap (M \cap N)$.
   B. $M \cap (N \cap P) = (M \cap N) \cap P$.
   C. $M \cap (N \cap P) = (N \cap P) \cap M$.
   D. $M \cap N \cap P = P \cap N \cap M$.

4. Given is a Venn diagram.



   The shaded region in the Venn diagram represents

   I. $A \cap B$
   II. $A \cup (A \cap B)$
   III. $A \cap (A \cup B)$

   A. I only.
   B. II only.
   C. I and III.
   D. II and III.

5. If $(2, k) = (c, 3)$, then the values of k and c respectively are

   A. 2 and 3
   B. 3 and 2
   C. −2 and 3
   D. −3 and 2

6. If $M = \{a, b, c, d\}$ and $N = \{x, y\}$, then $f = \{(a, x), (b, y), (c, x), (d, y)\}$ is a/ an

   A. into function.
   B. onto function.
   C. one-one function.
   D. bijective function.

7. Which of the following is a rational number?

   A. $\sqrt{2}$
   B. π
   C. 3.2137814115…
   D. 3.33333…

8. The multiplicative inverse of 2 is

   A. -2
   B. $-\frac{1}{2}$
   C. $\frac{1}{2}$
   D. 2

9. If $2i + 3 = b + ai - 3i,$ then the value of a will be

   A. -2
   B. -1
   C. 1
   D. 5

10. The complex number $2i^2 + 3 - 5i$ is equal to

    A. $1 - 5i.$
    B. $5 - 5i.$
    C. $3 - 3i.$
    D. $2 - 2i.$

11. If $a \times 10^{-2} = 0.050,$ then a is equal to

    A. -2
    B. 0.05
    C. 1
    D. 5

12. The value of $\log_3 9$ is equal to

A. 2
B. 3
C. 6
D. 9

13. The logarithmic form of $a^{-3} = x$ is

A. $\log_{-3} a = x$
B. $\log_x a = -3$
C. $\log_a x = -3$
D. $-\log_3 a = x$

14. The $\log \sqrt{\frac{x+y}{2}}$ can be expressed in expanded form as

A. $\frac{1}{2}\log(x+y) - \log 2$
B. $\frac{1}{2}\log(x+y) - \frac{1}{2}\log 2$
C. $\frac{1}{2}\log x + \log y - \log 2$
D. $\frac{1}{2}\log x + \frac{1}{2}\log y - \frac{1}{2}\log 2$

15. If $\log_m n = \frac{\log_a n}{\log_a m}$, then $\frac{\log_k 3}{\log_k 5}$ is equal to

A. $\log_3 5$
B. $\log_5 3$
C. $\log_k 3 + \log_k 5$
D. $\log_k 3 - \log_k 5$

16. The expression $\frac{x^2-1}{x-1}$, for $x \neq 1$, is

I. algebraic
II. rational
III. polynomial

A. I only.
B. II only.
C. I and III.
D. II and III.

17. If $a = 1$ and $b = -1$, then the value of $\frac{a^2-b^2}{a^2+b^2}$ is equal to

A. -1
B. 0
C. 1
D. 2

18. The simplest form of the expression $\frac{m^2-4mn}{4m}$ will be

A. $\frac{m^2-4n}{4}$.
B. $\frac{m-4n}{4}$.
C. m^2-n.
D. $m-n$.

19. If $(a+b)^2 = 16$ and $4ab = 12$, then $(a-b)^2$ is equal to

A. 2
B. 4
C. ± 2
D. ± 4

20. The expression t^3+8+p is a perfect cube, if p is equal to

A. $6t(t-2)$.
B. $3t(t-2)$.
C. $3t(t+2)$.
D. $6t(t+2)$.

21. The expression $3\sqrt{3}-6\sqrt{3}$ will be equal to

A. $3\sqrt{3}$
B. $-3\sqrt{3}$
C. $9\sqrt{3}$
D. $-9\sqrt{3}$

22. The factors of an expression $a(b-c)-b(c-b)$ are

A. $b-c$ and $a-b$.
B. $b-c$ and $a+b$.
C. $b+c$ and $a-b$.
D. $b+c$ and $a+b$.

23. The expression $xy-5y+4x-20$ is equal to

A. $(x-5)(y-4)$.
B. $(x-5)(y+4)$.
C. $(x+5)(y-4)$.
D. $(x+5)(y+4)$.

24. One of the factors of $2-16x^3$ is

A. $1-4x$.
B. $1-2x$.
C. $2+2x$.
D. $2+4x$.

25. The factorised form of the polynomial $1-3x-10x^2$ will be

A. $(1-5x)(1+2x)$.
B. $(1+5x)(1-2x)$.
C. $(1-5x)(1-2x)$.
D. $(1+5x)(1+2x)$.

26. If $(x-b)$ is a factor of a polynomial $P(x)$, then $P(b)$ is equal to

A. $-b$
B. b
C. 0
D. 1

27. If $2x^3 - 1$ is divided by $x + 1$, then the remainder will be

A. 1
B. 0
C. -1
D. -3

28. One of the factors of the polynomial $P(x) = (x-1)^2 - 4$ is

A. $x + 2$
B. $x - 2$
C. $x - 1$
D. $x + 1$

29. In a local cafe, the ratio of an apple juice to orange juice in their signature blend is 2:3.

The cafe currently has a total of 120 cups of juice, then the quantity of orange is

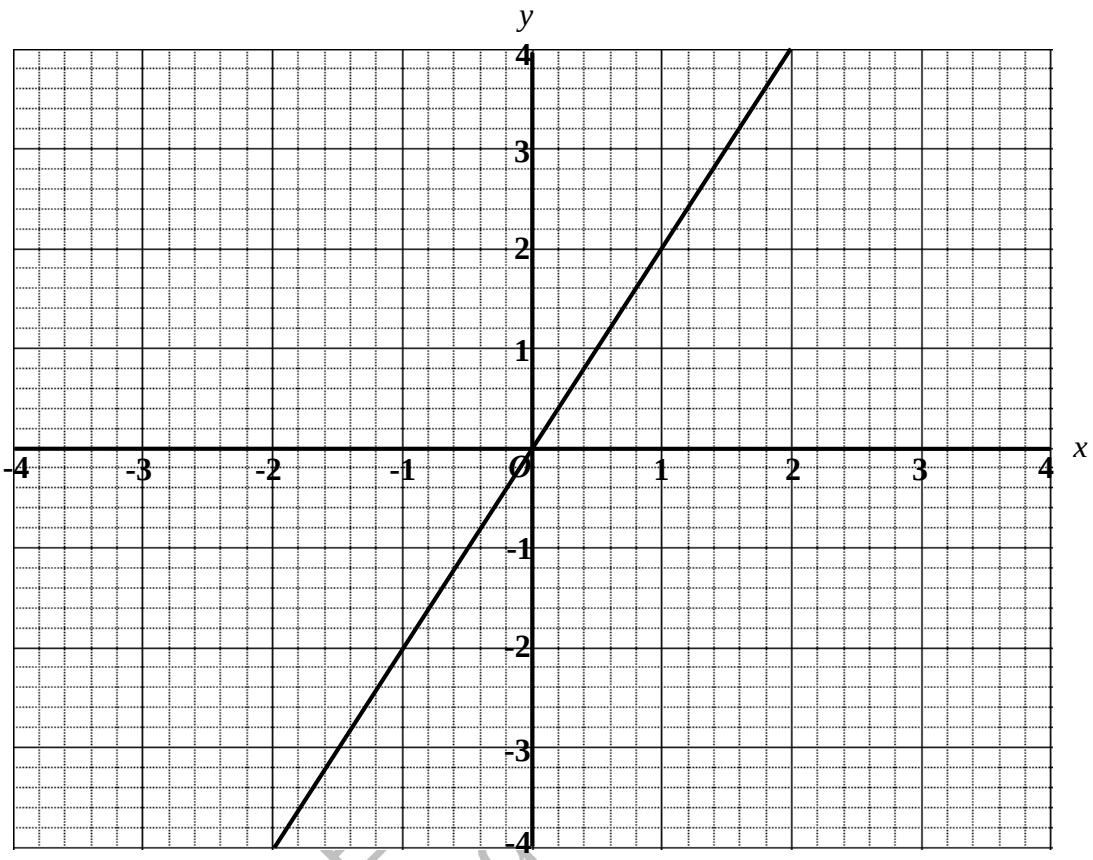
A. 80 cups.
B. 72 cups.
C. 48 cups.
D. 40 cups.

30. If $a : b :: c : d$, then according to alternendo theorem

A. $a : b :: d : c$
B. $a : c :: b : d$
C. $a + b : b :: c + d : c$
D. $a : a - b :: c : c - d$

Use the given graph to answer Q.31 and Q.32.

The given graph represents the variation in quantity '*y*' with the variation in quantity '*x*'.



31. The constant of proportionality will be

A. -2
B. -1
C. 1
D. 2

32. The equation form of the given relation will be

A. $y = \frac{x}{2}$.
B. $y = x$.
C. $y = 2x$.
D. $y = x^2$.

33. If the matrix $P = \begin{bmatrix} q & p \\ p & q \end{bmatrix}$ is a symmetric matrix, then P^t will be equal to

A. $\begin{bmatrix} p & q \\ p & q \end{bmatrix}$.

B. $\begin{bmatrix} q & p \\ q & p \end{bmatrix}$.

C. $\begin{bmatrix} p & q \\ q & p \end{bmatrix}$.

D. $\begin{bmatrix} q & p \\ p & q \end{bmatrix}$.

34. The additive identity of a matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ will be

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.

B. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.

C. $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$.

D. $\begin{bmatrix} -a & -b \\ -c & -d \end{bmatrix}$.

35. If $X = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}, Y = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $Z = \begin{bmatrix} 1 & 2 \end{bmatrix}$ are matrices, then which of the following is/ are possible for matrix multiplication?

I. XY
II. XZ
III. ZY

A. I only
B. II only
C. I and III
D. II and III

36. If $A = \begin{bmatrix} a & 18 \\ 2 & a \end{bmatrix}$ is a singular matrix, then the possible value(s) of *a* will be

A. ± 18
B. ± 6
C. 0
D. 9

37. If the equation of a matrix is $X - \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$, then the matrix *X* will be

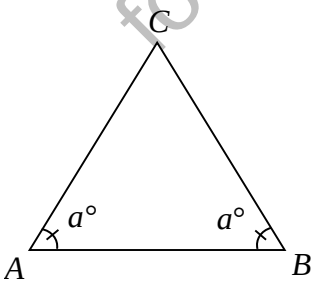
A. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$.
B. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$.
C. $\begin{bmatrix} -1 \\ -1 \end{bmatrix}$.
D. $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$.

38. If $|A| = 5$ and $A = \begin{bmatrix} 1 & 5 \\ 3 & x \end{bmatrix}$, then the value of *x* in matrix *A* will be

A. -20
B. -10
C. 10
D. 20

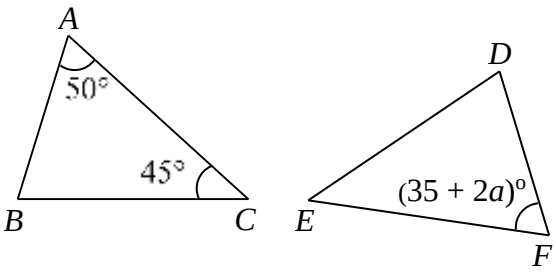
39. If the sum of all the three sides of a triangle *ABC* is 14 cm and $m\overline{AB} = 4\text{cm}$, then $m\overline{AC}$ is equal to

NOT TO SCALE



A. 5 cm.
B. 6 cm.
C. 10 cm.
D. 18 cm.

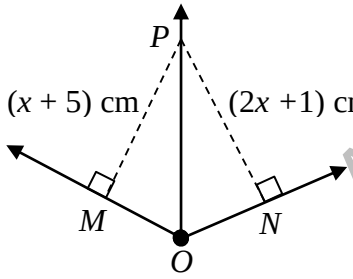
40. If $\Delta ABC \cong \Delta DFE$, then the value of a is equal to



NOT TO SCALE

A. 20^o
B. 25^o
C. 35^o
D. 50^o

41. In the given diagram, OP is the angle bisector of $\angle MON$.



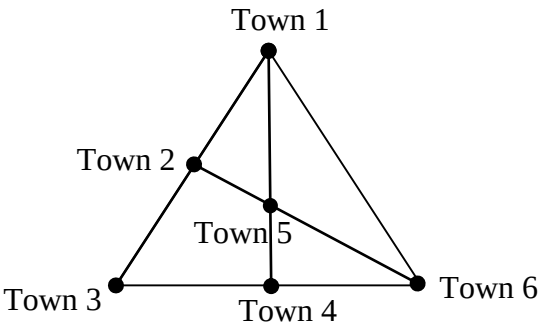
NOT TO SCALE

Based on the given information, the value of x will be

A. 2
B. 3
C. 4
D. 6

42. The given diagram shows the various paths connecting towns.

- The paths connecting Town 1, Town 3 and Town 6 form a triangle.
- Town 2 is halfway between Town 1 and Town 3.
- Town 4 lies half way between Town 3 and Town 6.

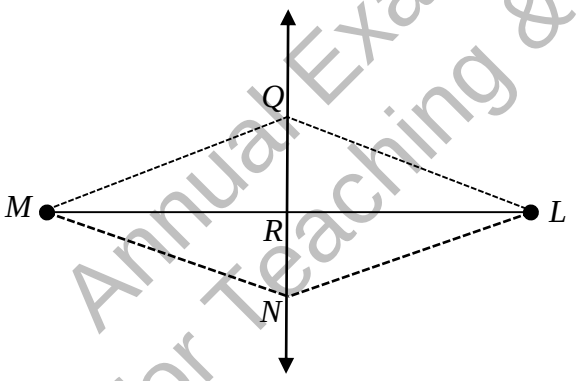


NOT TO SCALE

If direct paths from Town 2 to Town 6 lies through Town 5, then the distance between Town 2 to Town 5 would be

A. half of the distance from Town 3 to Town 4.
B. half of the distance from Town 2 to Town 6.
C. one third of the distance from Town 2 to Town 6.
D. one third of the distance from Town 4 to Town 6.

43. Consider the given diagram.



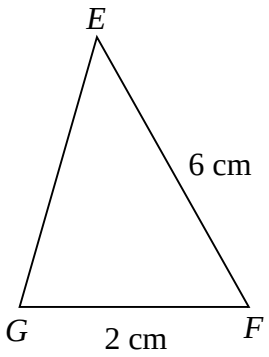
NOT TO SCALE

If $QM = QL$ and $NM = NL$, then

I. $QR = NR$
II. $MR = LR$
III. $\angle MRQ = 90°$

A. I only.
B. III only.
C. I and II.
D. II and III.

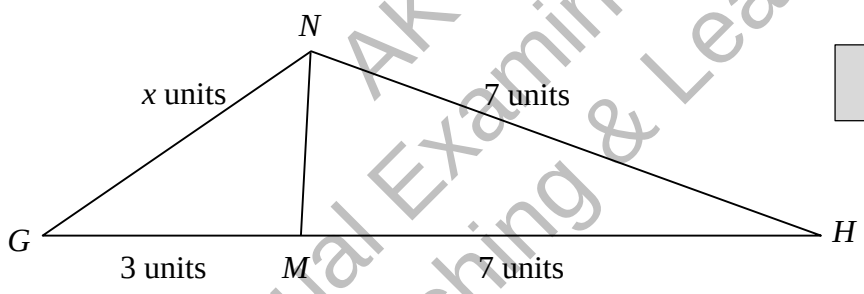
44. Which of the following is TRUE for the given triangle *EFG*?



NOT TO SCALE

A. $\angle F > \angle G$
B. $\angle G > \angle E$
C. $\angle E > \angle F$
D. $\angle G = \angle E + \angle F$

45. In the given triangle *NGH*, if *NM* bisects $\angle GNH$, then *x* will be equal to



NOT TO SCALE

A. 3 units.
B. 7 units.
C. 10 units.
D. 11 units.

END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

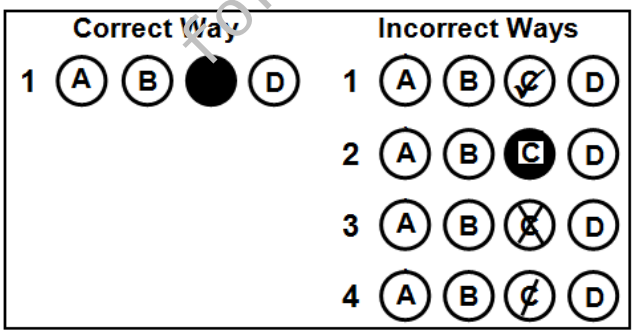
ANNUAL EXAMINATIONS (THEORY) 2025

Mathematics Paper I

Time: 1 hour 20 minutes Marks: 45

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 45 only.
4. In each question, there are four choices A, B, C, D. Choose ONE. On the answer grid, black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
8. You may use a simple calculator if you wish.

1. The set of integers, whole numbers and natural numbers are represented by Z, W and N respectively.

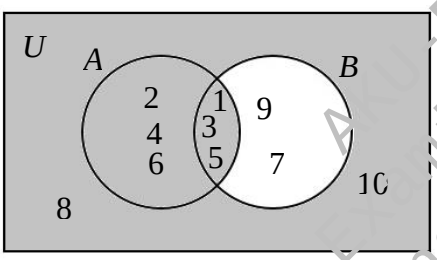
   Which one of the following statements is TRUE about the given sets?

   A. $Z \cup W = W$
   B. $Z \cap N = N$
   C. $N \cap W = W$
   D. $N \cup W = Z$

2. If M, N and P are three non-empty sets, then according to associative property of union the correct equation will be,

   A. $M \cup (N \cup P) = (M \cup N) \cup P$.
   B. $M \cap (N \cap P) = (M \cap N) \cap P$.
   C. $M \cap (N \cup P) = (M \cup N) \cap P$.
   D. $M \cap (N \cup P) = (M \cap N) \cup P$.

3. The shaded region in the Venn diagram also represents

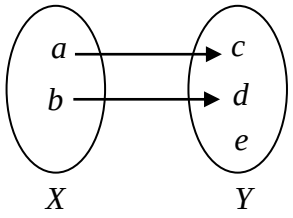


   A. $(A \cup B)'$.
   B. $(A - B)'$.
   C. $A - B$.
   D. $A \cup B'$.

4. If $A = \{1, 2, 3, 4, 5\}$, then the number of ordered pairs in $A \times A$ will be

   A. 5
   B. 10
   C. 25
   D. 32

5. If the element *e* is removed from the set *Y*, then the given mapping will become a/ an



A. onto function only.
B. one-one function only.
C. one-one and into function.
D. one-one and onto function.

6. If $A = \{1, 2, 3,\}$ and $U = \{1, 2, 3, 4, 5\}$, then A' will be equal to

A. $\{1, 2, 3, 4, 5\}$.
B. $\{1, 2, 3\}$.
C. $\{2, 3,\}$.
D. $\{4, 5\}$.

7. The simplest form of $\left(7^2\right)^{\frac{3}{5}}$ in radical form will be

A. $\sqrt[5]{7}$
B. $\sqrt[5]{7^2}$
C. $7\times\sqrt[5]{7}$
D. $7\times\sqrt[5]{7^2}$

8. The simplified form of $\frac{a\times b^{-2}}{a^{-2}\times b^3}$ in radical form will be

A. $a^{-3}\times b^{-5}$
B. $a^3\times b^{-5}$
C. $a^3\times b$
D. $a^{-3}\times b$

9. If $x+3i-1=2+3i$, then the value of *x* will be

A. -3
B. -2
C. 2
D. 3

10. On simplification of $ai + ib - b - a$, we get

A. $(a+b)i-1$
B. $(a+b)(i-1)$
C. $a-b+(a+b)i$
D. $(a-b)i+a+b$

11. If a number 0.0101 can also be expressed as $a \times 10^b$, then the value of *a* and *b* respectively will be

A. 10.1 and –2
B. 1.01 and –2
C. 1.01 and 2
D. 10.1 and 2

12. If $\log_x\left(\frac{1}{4^2}\right) = -2$, then the value of *x* wil be

A. – 4
B. – 2
C. 2
D. 4

13. The value of $\log_2(16)^{\frac{3}{4}}$ will be

A. 1
B. 2
C. 3
D. 8

14. In single logarithm, the expression $\log 3x - \log x^2 + \log(x-y)$ will be equal to

A. $\log(3x - x^2 - y)$.
B. $\log 3x^3(x-y)$.
C. $\log \frac{3x-x^2}{x-y}$.
D. $\log \frac{3x(x-y)}{x^2}$.

15. The logarithm $\frac{\log_3 5}{\log_3 7}$ can be expressed as

A. $\log_3 5 - \log_3 7$
B. $\log_3 7 - \log_3 5$
C. $\log_5 7$
D. $\log_7 5$

16. In the given options, an example of polynomial is

A. $x^2 + \frac{1}{x^2}$

B. $x^2 + \frac{1}{\sqrt{x}} + \frac{1}{2}$

C. $x^2 + \sqrt{x} + \frac{1}{2}$

D. $x^2 + x + \frac{1}{\sqrt{2}}$

17. On simplification, $\frac{y^0 \times x}{x^0 \times y}$ is equal to

A. $\frac{x}{y}$

B. $\frac{y}{x}$

C. 1

D. 0

18. If $(x+2y)^2 = 361$ and $xy = -60$, then the value of $x-2y$ will be equal to

A. ± 19

B. $\pm\sqrt{481}$

C. $\pm\sqrt{601}$

D. ± 29

19. If $y - \frac{1}{y} = 3$, then $y^3 - \frac{1}{y^3}$ will be

A. 24

B. 27

C. 36

D. 54

20. The value of $(2+4) - \sqrt{4} + \sqrt{2}$ is equal to

A. $4 + \sqrt{2}$

B. $4 + \sqrt{6}$

C. $6 - \sqrt{2}$

D. $6 - \sqrt{6}$

21. The product of expressions is given as $(a-1)(a^2+a+1)$.

The simplest form of this product will be

A. $(a+1)^3$
B. $(a-1)^3$
C. a^3-1
D. a^3+1

22. The factors of $a^2-3a+2ab-6b$ are

A. $(a+3)$ and $(a-2b)$.
B. $(a+3)$ and $(a+2b)$.
C. $(a-3)$ and $(a-2b)$.
D. $(a-3)$ and $(a+2b)$.

23. The complete factorised form of the expression $9-(a^2+1)^2$ will be

A. $(3+a^2+1)(3+a^2-1)$.
B. $(3+a^2+1)(3-a^2-1)$.
C. $(9+a^2+1)(9+a^2-1)$.
D. $(9+a^2+1)(9-a^2-1)$

24. The expression $k^2-kt-2t^2$ can be expressed in terms of product of factors as

A. $(k-t)(k-2t)$.
B. $(k+t)(k-2t)$.
C. $(k+t)(k+2t)$.
D. $(k-t)(k+2t)$.

25. The polynomial $(3a+1)^3$ is the factorised form of the polynomial

A. $27a^3+27a^2+9a+1$
B. $27a^3+9a^2+3a+1$
C. $27a^3+3a^2+3a+1$
D. $27a^3+a^2+a+1$

26. The factorised form of $8a^3-125$ to the lowest forms is

A. $(2a+5)(4a^2-10a-25)$.
B. $(2a-5)(4a^2-10a+25)$.
C. $(2a+5)(4a^2+10a+25)$.
D. $(2a-5)(4a^2+10a+25)$.

27. If $P(x) = x^3 + 1$ is divided by $(x + 2)$, then the remainder is

A. -7
B. -5
C. 7
D. 9

28. Which of the given options is NOT a zero of the polynomial $(2a + 1)(a + 3)(a - 3)(a - 1)$?

A. -3
B. -1
C. 1
D. 3

29. If x, $a + b$ and $a - b$ are in continued proportion, then x is equal to

A. $(a + b)^2$
B. $(a - b)^2$
C. $\dfrac{(a - b)^2}{a + b}$
D. $\dfrac{(a + b)^2}{a - b}$

30. If numbers k, 5, 3 and 15 are in fourth proportion, then the value of k is

A. $\dfrac{1}{5}$
B. 1
C. 5
D. 15

31. If $x : 5 = 7 : y$, then applying the componendo theorem, we get

A. $\dfrac{x + 5}{5} = \dfrac{7 + y}{y}$.
B. $\dfrac{x - 5}{5} = \dfrac{7 - y}{y}$.
C. $\dfrac{x}{x - 5} = \dfrac{7}{7 - y}$.
D. $\dfrac{x}{x - 5} = \dfrac{7}{7 + y}$.

32. The volume of a gas 'V' varies inversely with pressure 'P' at a constant temperature. The volume of the gas is noted as 240 cubic centimetres at 30 kg/ cm^2 pressure.

The volume of this gas at 45 kg/ cm^2 pressure will be

A. 5.6 cm^3
B. 160 cm^3
C. 360 cm^3
D. 720 cm^3

33. The matrix $\begin{bmatrix} a & 0 \\ b & 2 \end{bmatrix}$ is a scalar matrix if

A. $a = 0$ and $b = 2$
B. $a = 0$ and $b = -2$
C. $a = 2$ and $b = 0$
D. $a = 2$ and $b = 2$

34. If $M = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$, $N = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$ and $P = \begin{bmatrix} 2 & 1 \end{bmatrix}$ are given matrices, then which of the matrix product is possible?

I. MN
II. PM
III. NP

A. I only
B. II only
C. I and III
D. II and III

35. The multiplicative inverse of the matrix $\begin{bmatrix} 2 & 6 \\ -1 & -3 \end{bmatrix}$ is

A. $\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$.
B. $-\frac{1}{12}\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$.
C. $\frac{1}{12}\begin{bmatrix} -3 & -6 \\ 1 & 2 \end{bmatrix}$.
D. does not exist.

36. If the matrix $\begin{bmatrix} a & 6 \\ 1 & -3 \end{bmatrix}$ is a singular matrix, then the value of a will be

A. -3
B. -2
C. 0
D. 2

37. If $2x+3y=2$ and $x-2y=1$ are two simultaneous linear equations, then the matrix form of the equations will be

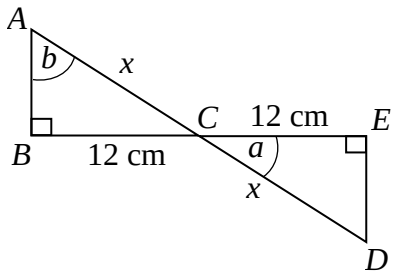
A. $\begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 1 \\ 2 \end{bmatrix}$.
B. $\begin{bmatrix} 2 & 3 \\ 1 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 2 \\ 1 \end{bmatrix}$.
C. $\begin{bmatrix} 2 & 1 \\ 3 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 2 \\ 1 \end{bmatrix}$.
D. $\begin{bmatrix} 2 & 1 \\ 3 & -2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 1 \\ 2 \end{bmatrix}$.

38. After solving the matrix equation $3A+\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 1 \\ -1 \end{bmatrix}=\begin{bmatrix} 1 \\ 2 \end{bmatrix}$, the matrix A will be

A. $\begin{bmatrix} 0 \\ \frac{1}{3} \end{bmatrix}$.
B. $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$.
C. $\begin{bmatrix} 0 \\ -1 \end{bmatrix}$.
D. $\begin{bmatrix} 0 \\ -\frac{1}{3} \end{bmatrix}$.

39. In the given diagram, the value of b in terms of a will be equal to

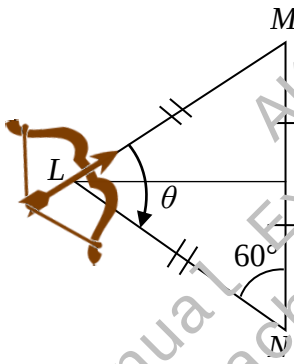
NOT TO SCALE



A. $a°$
B. $2a°$
C. $(90-a)°$
D. $2(90-a)°$

40. An archer has two targets placed at M and N, such that both are equal distances from the archer standing at L as shown in the given diagram. After hitting the target at M, he turns to target at N, rotating an angle θ.

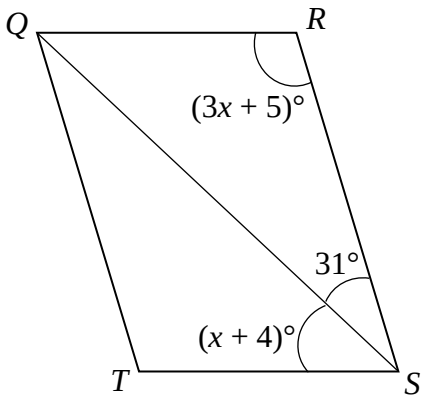
NOT TO SCALE



The value of θ will be

A. 50^o
B. 60^o
C. 100^o
D. 120^o

41. In the given parallelogram *QRST*, the value of *x* will be

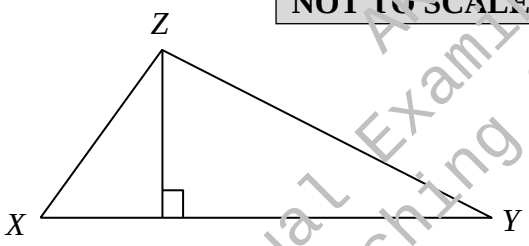


NOT TO SCALE

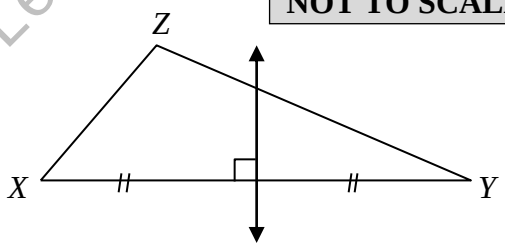
A. 31
B. 35
C. 70
D. 94

42. Which of the following diagrams represent a right bisector of the side *XY* of the triangle *XYZ*?

A



B



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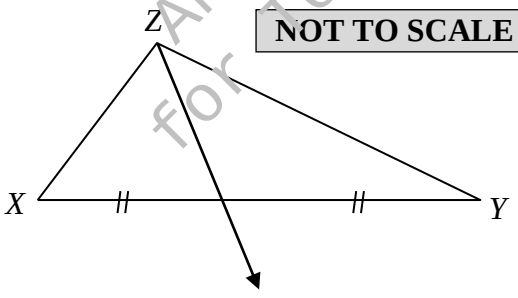

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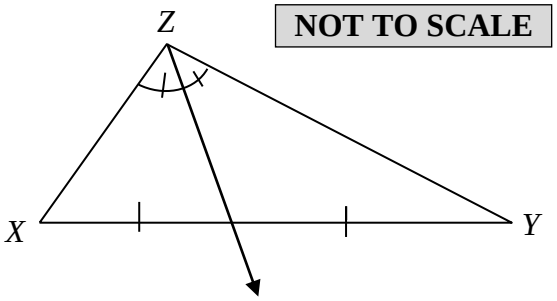

43. Consider the given diagram.

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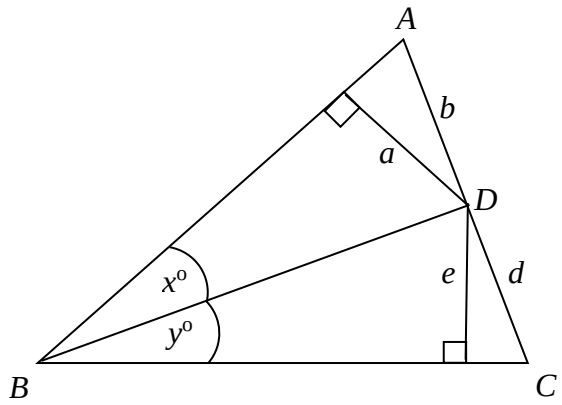


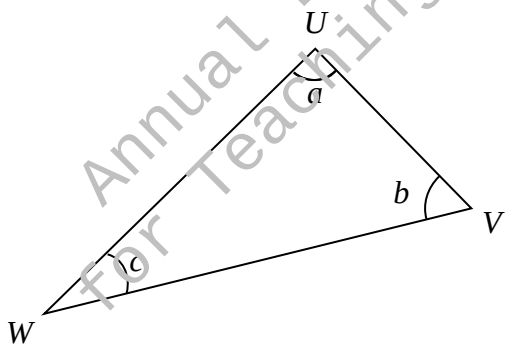
If $a = e$, then the correct relation(s) is/ are

I. $x° = y°$
II. $a = b$
III. $b = d$

A. I only.
B. II only.
C. I and III.
D. II and III.

44. In the given triangle, *VW* is the longest side and *UV* is the smallest side.

NOT TO SCALE

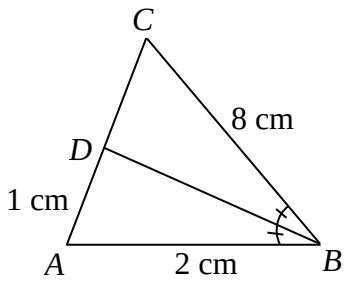


The CORRECT relationship between the angles is

A. $c > a$.
B. $b > a$.
C. $a > c$.
D. $c > b$.

45. In the following figure, BD is the angle bisector of $\angle ABC$. If AB = 2 cm, BC = 8 cm, and AD = 1 cm, then the length of CD is

A. 1 cm.
B. 2 cm.
C. 3 cm.
D. 4 cm.



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END OF PAPER

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

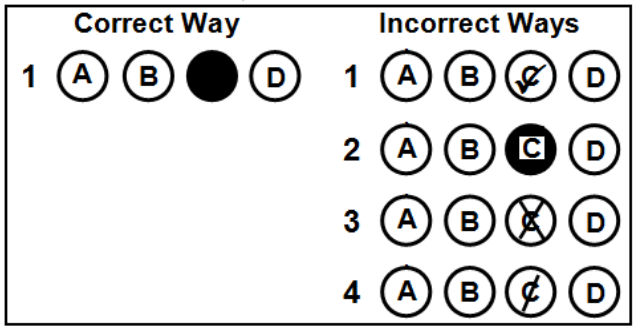
MODEL EXAMINATION PAPER 2026 AND ONWARDS

Mathematics (Science Group) Paper I

Time: 1 hour and 20 minutes Marks: 45

INSTRUCTIONS:

1. Check your name and school information on the question paper and Optical Mark Recognition (OMR) sheet. Sign on both if the information is correct.
2. Read each question carefully.
3. Answer all questions on the provided OMR sheet within the allotted time. DO NOT mark your answers on the question paper.
4. There are 100 answer numbers on the OMR sheet. Use answer numbers 1 to 45 only.
5. Each question has four choices: A, B, C, and D. Choose ONE correct answer only. On the OMR sheet, completely fill in the circle corresponding to your choice with a pencil as shown in the example below.



Candidate's Signature

6. If you want to change your answer, ERASE the first answer completely with an eraser, before filling in the new circle. Ensure your marks are dark and clear. Do not make stray marks or leave incomplete fillings as the OMR machine ONLY records what is in the circles.
7. Do not fold, tear, or damage the OMR sheet. Damaged sheets may be scanned incorrectly.
8. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
9. You may use a simple calculator if you wish.

List of Formulae

Note:

- The symbols used in the formulae have their usual meaning.
- The same formulae will be provided in the annual and september examinations.

Real Numbers

$x^m \times x^n = x^{m+n}$ $\quad (x \times y)^n = x^n \times y^n$ $\quad \left(x^m\right)^n = x^{mn}$

$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$, where $y \neq 0$ $\quad \frac{x^m}{x^n} = x^{m-n}$

Logarithms

$\log_a(m \times n) = \log_a m + \log_a n$ $\quad \log_a\left(\frac{m}{n}\right) = \log_a m - \log_a n$ $\quad \log_a b = n \Leftrightarrow a^n = b$

$\log_a(m)^n = n \log_a m$ $\quad log_m n = \frac{log_a n}{log_a m}$

Sets Theory

$A \Delta B = (A \cup B) - (A \cap B)$ $\quad (A \cup B)^c = A^c \cap B^c$ $\quad (A \cap B)^c = A^c \cup B^c$

Factorisation

$(a+b)^2 = a^2 + 2ab + b^2$ $\quad (a-b)^2 = a^2 - 2ab + b^2$

$(a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$ $\quad (a+b)^2 - (a-b)^2 = 4ab$

$(a+b)(a-b) = a^2 - b^2$ $\quad (a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ $\quad (a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $\quad a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Introduction to Coordinate Geometry

$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\quad \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $\quad y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

Similar Figures

$\frac{1}{2}h \times b$ $\quad l \times b$ $\quad l^2$ $\quad 6l^2$

l^3 $\quad \pi r^2$ $\quad l \times b \times h$ $\quad 2(l \times b + b \times h + l \times h)$

Introduction to Trigonometry

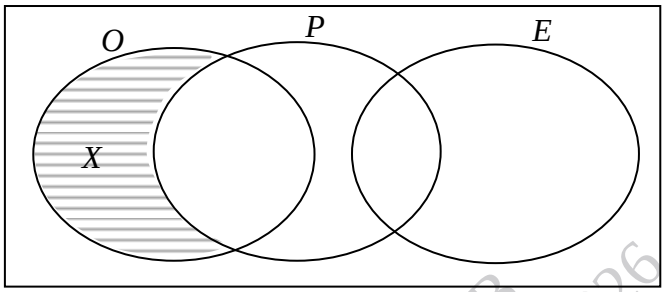
$1° = \frac{\pi}{180} rad$ $\quad 1rad = \left(\frac{180}{\pi}\right)^\circ$ $\quad H^2 = P^2 + B^2$

$\sin^2\theta + \cos^2\theta = 1$ $\quad 1 + \tan^2\theta = \sec^2\theta$ $\quad 1 + \cot^2\theta = \cos ec^2\theta$

1. Given that $A = \{1, 2\}$ and $B = \{1, \{2, 3\}\}$, then $A \cap B$ will be

   A. $\{1\}$.
   B. $\{1, 2\}$.
   C. $\{1, \{2\}\}$.
   D. $\{\{1, 2\}\}$.

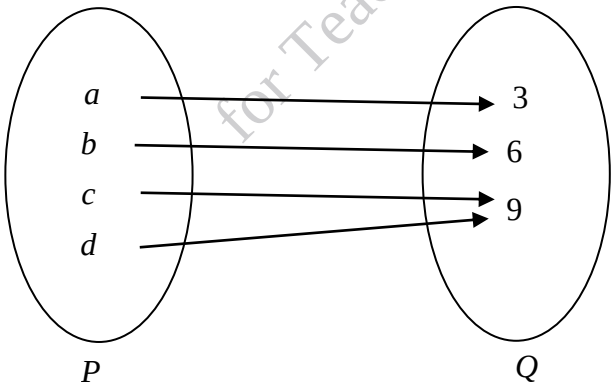
2. There are 10 balls in a bag. The balls are numbered as 1 to 10. Amaan wants to separate the balls in three sets of even (E), odd (O) and prime (P) numbers as shown in the given Venn diagram.



   The shaded region, represented by X, will contain the balls numbered as

   A. $\{2, 4, 6, 8, 10\}$.
   B. $\{1, 3, 5, 7, 9\}$.
   C. $\{1, 3, 5, 7\}$.
   D. $\{1, 9\}$.

3. The domain of the binary relation, between set P and set Q, in the given diagram is



   A. $\{a, b, c, d\}$.
   B. $\{a, b, d\}$.
   C. $\{a, b, c\}$.
   D. $\{c, d\}$.

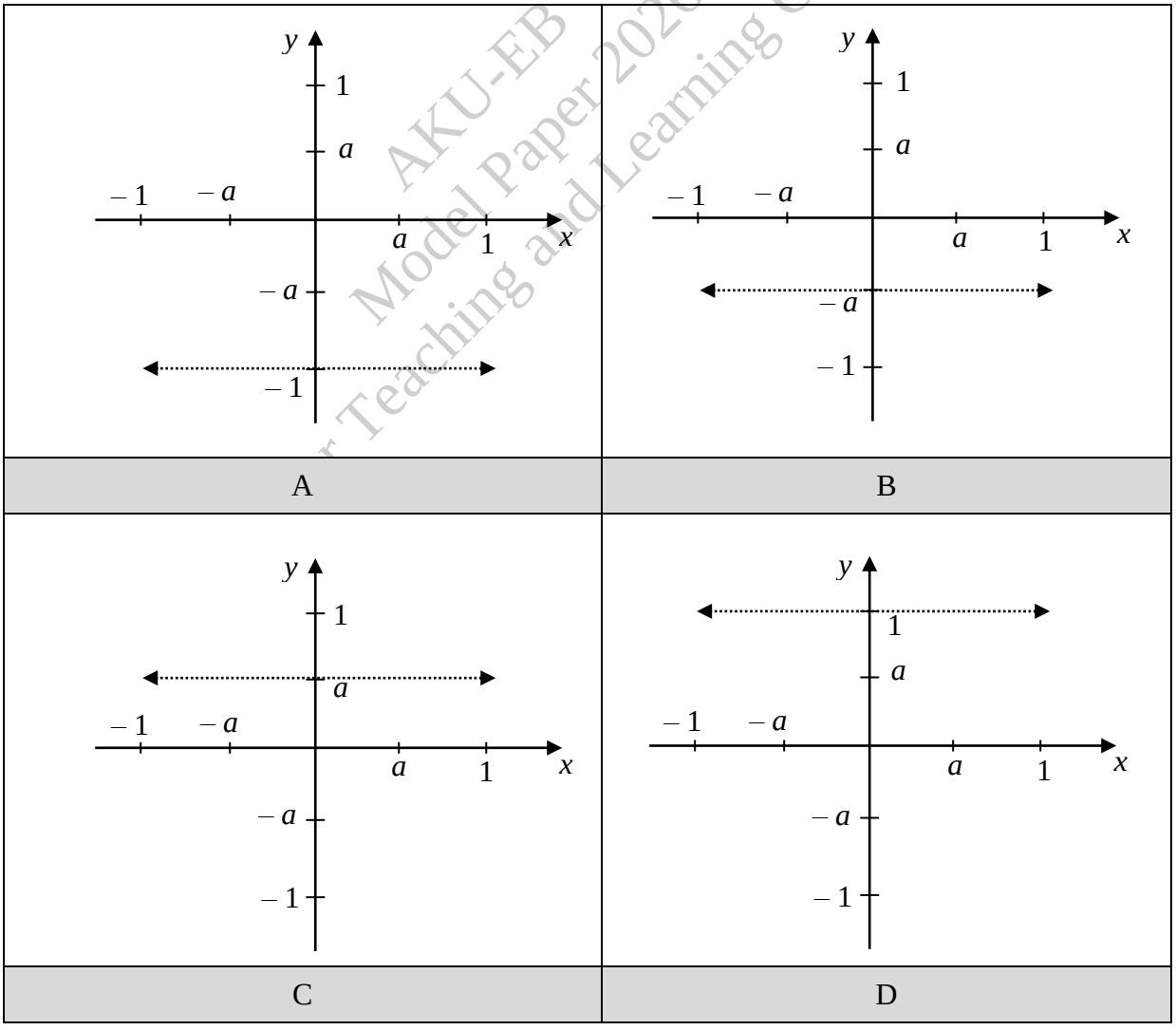
4. If $A = \{1, 2, 3, 4\}$ and $B = \{10, 20\}$, then which of the following is an into function from A to B?

   A. $\{(1, 10), (2, 20)\}$
   B. $\{(1, 10), (2, 10), (3, 10)\}$
   C. $\{(1, 10), (2, 10), (3, 10), (4, 10)\}$
   D. $\{(1, 10), (2, 10), (3, 20), (4, 20)\}$

5. If $A = \{a, e, i\}$ and $B = \{1, 2, 3, 4\}$, then one of the functions from A to B is

   A. $\{(a,1),(e,2)\}$.
   B. $\{(a,1),(e,1),(i,1)\}$.
   C. $\{(a,1),(e,2),(i,3),(a,4)\}$.
   D. $\{(a,1),(a,2),(a,3),(a,4)\}$.

6. The correct graphical representation of $ay + a = 0$ is



7. $\frac{a^4 - 4a^2}{a^2 - 2a}$ is equal to

A. $a^2 + 2a$.
B. $a^2 - 2a$.
C. $a^2 + 4a$.
D. $a^2 - 4a$.

8. $(a + 2b + c)^2$ is equal to

A. $a^2 + 2b^2 + c^2 + 2ab + 2bc + 2ca$.
B. $a^2 + 4b^2 + c^2 + 4ab + 2bc + 2ca$.
C. $a^2 + 4b^2 + c^2 + 4ab + 4bc + 2ca$.
D. $a^2 + 2b^2 + c^2 + 2ab + 4bc + 2ca$.

9. $u^3 - 27v^3$ can also be expressed as

A. $(u + 3v)(u^2 - uv + v^2)$.
B. $(u - 3v)(u^2 + uv + v^2)$.
C. $(u + 3v)(u^2 - 3uv + 9v^2)$.
D. $(u - 3v)(u^2 + 3uv + 9v^2)$.

10. On factorisation of $25x^2 + 5ax + 10x + 2a$, we get

A. $(5x + a)(5x + 2)$.
B. $(5a + x)(5a + 2)$.
C. $(5x^2 + a)(5x + 2)$.
D. $(5ax + ax)(5ax + 2)$.

11. $8p^3 + 12p^2q + 6pq^2 + q^3$ can also be expressed as

A. $(2p)^3 + q^3$
B. $(2p + q)^3$
C. $(p + 2q)^3$
D. $p^3 + 2q^3$

12. When $x^2 + kx - 1$ is divided by $x - 1$, the remainder is 2. The value of k is

A. 2
B. 1
C. 0
D. – 2

13. $(t+2)^3$ can also be expressed as

A. $t^3+6t^2+12t+8$
B. $t^3-6t^2+12t-8$
C. t^3+3t^2+3t+8
D. t^3-3t^2+3t-8

14. On simplification of $\left(1-\frac{1}{x}\right)\div\frac{1}{x}$, we get

A. 1
B. $x-1$
C. $\frac{x-1}{x^2}$
D. $\frac{1-x}{x^2}$

15. $45x^2$ is the least common multiple (LCM) of

A. $3x^2$ and $15x$.
B. $3x$ and $15x$.
C. $5x^2$ and $9x$.
D. $5x$ and $9x$.

16. $\frac{b+c}{2}-\frac{b+c}{3}$ is equal to

A. $-\frac{b+c}{6}$
B. $-\frac{b+5c}{6}$
C. $\frac{b+c}{6}$
D. $\frac{b+5c}{6}$

17. Which of the following fractions is a proper fraction?

(**Note:** $x \neq a$ and $x \neq b$)

A. $\dfrac{(x-b)^4}{(x-a)^2(x-b)}$

B. $\dfrac{(x-b)^3}{(x-a)^2(x-b)}$

C. $\dfrac{(x-a)^3}{(x-a)^2(x-b)}$

D. $\dfrac{(x-a)^2}{(x-a)^2(x-b)}$

18. The solution set of $\dfrac{x-1}{2} = 0$ is

A. $\{-1\}$.
B. $\{-3\}$.
C. $\{3\}$.
D. $\{1\}$.

19. Given that $|-x| = -1$, the solution set which must satisfy the equation is

A. $\{-1\}$.
B. $\{\ \}$.
C. $\{1\}$.
D. $\{\phi\}$.

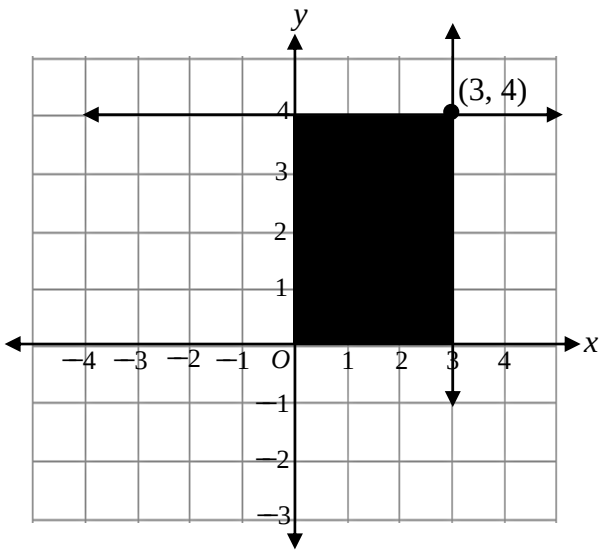
20. The inequality which describes $m(x-1) > m$, where m is a natural number, will be

A. $x < 1$
B. $x < 2$
C. $x > 1$
D. $x > 2$

21. If x is a negative number, then the mathematical statement which must be TRUE is

A. $-x \leq 0$
B. $-x \geq 0$
C. $x < 0$
D. $x > 0$

22. The given figure shows the solution region of inequalities.



Two of the inequalities satisfying the solution region are

A. $x \leq 4$ and $y \leq 3$
B. $x \leq 3$ and $y \leq 4$
C. $x \geq 4$ and $y \geq 3$
D. $x \geq 3$ and $y \geq 4$

23. The solution set of $\sqrt{x-\frac{1}{4}} = \frac{1}{2}$ will be

A. $\left\{\frac{1}{4}\right\}$.
B. $\left\{\frac{1}{2}\right\}$.
C. $\left\{0, \frac{1}{4}\right\}$.
D. $\left\{0, \frac{1}{2}\right\}$.

24. The solution set of $5 - x < 0$, where $x \in R$, will be

A. $\{x | x \in R,\ x < 5\}$.
B. $\{x | x \in R, x > 5\}$.
C. $\{x | x \in R, x > -5\}$.
D. $\{x | x \in R, x < -5\}$.

25. The FALSE statement about the rectangular coordinate system in the plane is that the

A. *x*-axis and *y*-axis are parallel to each other.
B. *x* and y components can be positive and equal.
C. ordered pair of real numbers can represent every point in the plane.
D. coordinate system is also known as the Cartesian Coordinate System.

26. If $A - 3B = 2i - 3j$, and $B = j$, then the vector A will be

A. $2i - 6j$.
B. $2i + 6j$.
C. $2i$.
D. $6j$.

27. In a triangle *XYZ*, if one of the sides is $\boldsymbol{x} = (3, 0)$ and the other side is $\boldsymbol{y} = (0, -3)$, then these vectors are

(**Note**: The sides of a triangle are represented as vectors.)

A. parallel to each other.
B. opposite of each other.
C. at the angle of 45° to each other.
D. at the angle of 90° to each other.

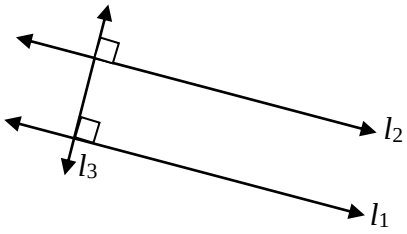
28. The valid condition for the distance between two points (a,b) and (c,d) will be

A. $(a-c)^2+(b-d)^2>0$
B. $(b-a)^2+(d-c)^2>0$
C. $(a-c)^2+(b-d)^2<0$
D. $(b-a)^2+(d-c)^2<0$

29. The midpoint of the line segment joining the two points $(2,-2)$ and $(-2,-2)$ is (m,n). The value of n^2 is equal to

A. -2
B. -4
C. 4
D. 0

30. Consider the given figure.



NOT TO SCALE

If the gradient of the line l_2 is $-\frac{1}{\sqrt{5}}$, then the gradient of the lines l_1 and l_3 will be

A. $-\frac{1}{\sqrt{5}}$ and $-\sqrt{5}$ respectively.

B. $-\frac{1}{\sqrt{5}}$ and $\sqrt{5}$ respectively.

C. $\frac{1}{\sqrt{5}}$ and $-\sqrt{5}$ respectively.

D. $\frac{1}{\sqrt{5}}$ and $\sqrt{5}$ respectively.

31. The straight line that has a slope 2 and y-intercept 8 is

A. $2x - y - 8 = 0$
B. $2x + y + 8 = 0$
C. $-2x - y + 8 = 0$
D. $-2x + y - 8 = 0$

32. The slope-intercept form of the line $3x - 3y + 6 = 0$ will be

A. $y = x + 2$
B. $y = x - 6$
C. $y = 3x + 6$
D. $y = -3x - 2$

33. Consider the two intersecting lines, $y = 2x - 5$ and $y = -2x + 11$.

The locus of points that are equidistant from the given intersected lines are the straight lines

A. $x = 0$ and $y = 0$
B. $x = 4$ and $y = 3$
C. $x = 2$ and $y = -2$
D. $x = 3$ and $y = -4$

34. Two points, *S* and *T*, are 10 cm apart on a straight line.

The locus of a point *Q* that is equidistant from *S* to *T* is a

A. parallel line to *ST*.
B. point that lies on *ST*.
C. circle with a dimeter *ST*.
D. perpendicular bisector of *ST*.

35. An angle bisector is a locus of a point that is equidistant from two lines.

Which of the following options is/ are correct for the given statement?

I. Parallel lines
II. Perpendicular lines
III. Intersecting lines

A. I only
B. II only
C. I and III
D. II and III

36. Two similar rectangles have sides in the ratio 2:3.

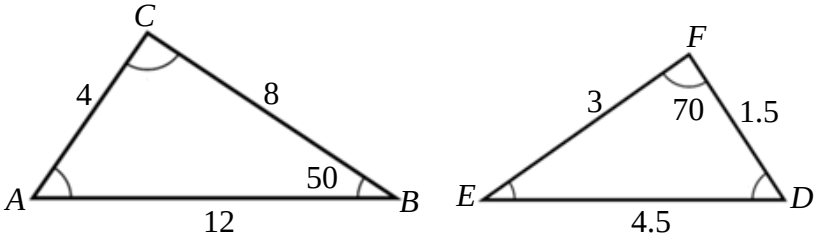
If the area of the larger rectangle is 27 cm², then the area of the smaller rectangle will be

A. 9 cm²
B. 12 cm²
C. 13.5 cm²
D. 18 cm²

37. If two triangles are similar, then their

A. corresponding angles are equal.
B. corresponding sides are equal.
C. perimeters are equal.
D. areas are equal.

38. Sameer has given two triangular buildings to analyse their sizes and angles.

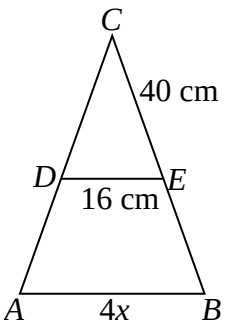


NOT TO SCALE

Based on his analysis the triangles

A. are equal in sides and equal in angles.
B. have equal ratios of sides and are equal in angles.
C. are equal in sides and have equal ratios of angles.
D. have equal ratios of sides and equal ratios of angles.

39. In the given diagram, *D* and *E* are the midpoints of the sides *AC* and *BC* respectively.



NOT TO SCALE

If $AB = 4x$, $DE = 16$ cm and $EC = 40$ cm, then the value of x is equal to

A. 8 cm.
B. 12 cm.
C. 16 cm.
D. 32 cm.

40. Aliya is designing a square-shaped garden with diagonal pathways measuring 8 m in length. She wants to install a fence around the garden's perimeter to protect the plants.

How much fencing material will she need to go all the way around the garden?

A. $4\sqrt{2}$ m
B. $16\sqrt{2}$ m
C. 32 m
D. 48 m

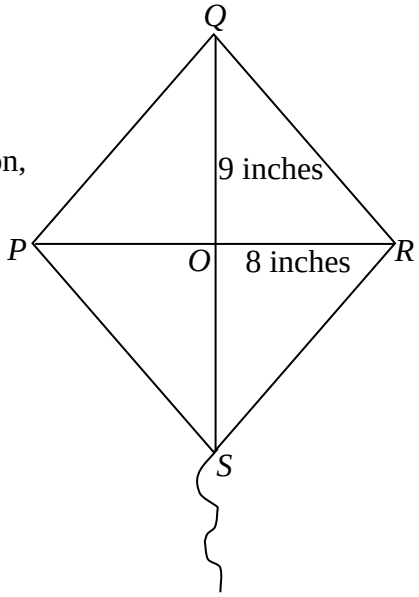
41. Sana is designing a kite for an art competition. The frame of the kite must be a parallelogram, with two bamboo sticks *PR* and *QS* acting as its diagonals as mentioned in a given diagram.

NOT TO SCALE

The sticks are bisecting at point *O*, and the kite's paper is stretched tightly over the frame.

The length of $OR = 8$ inches, $QO = 9$ inches, $PS = (PR - 3)$ inches and $RS = (QS - 4)$ inches.

If she wants to decorate the edges *PQRS* of the kite with a ribbon, then the total length of the ribbon will be



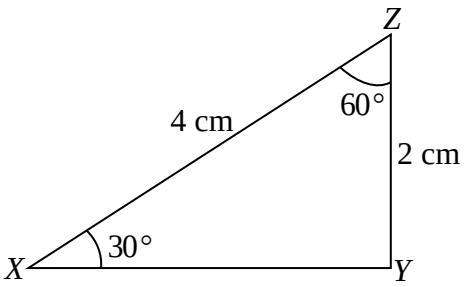
A. 20
B. 27
C. 34
D. 54

42. $1\frac{1}{4}$ rotation in anticlockwise direction is equal to

A. 90^o
B. 270^o
C. 288^o
D. 450^o

43. In the given triangle XYZ, side XY is equal to

NOT TO SCALE



A. 2 cm.
B. $2\sqrt{3}$ cm.
C. 3 cm.
D. 4 cm.

44. If the length of the sides of a right angled triangle are k, l and m such that $l < k < m$, then according to Pythagoras' theorem,

A. $m^2 = k^2 - l^2$
B. $l^2 = (k + m)^2$
C. $m^2 = (k + l)^2$
D. $l^2 = m^2 - k^2$

45. $\frac{\sin^2\theta}{1-\sin^2\theta}$ is equal to

A. $-tan^2\theta$.
B. $cot^2\theta$.
C. $-cot^2\theta$.
D. $tan^2\theta$.

END OF PAPER