



MATHS

BOOKS - HT Olympiad Previous Year Paper

IMO QUESTION PAPER 2020 SET 2

Mathematical Reasoning

1. If $x = k^2$ and $y = k$ is a solution of $x - 5y + 6 = 0$, then find the values of k .

A. 1,2

B. 2,3

C. 1,5

D. 2,4

Answer: B



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2. The area of triangle formed by the points (6, 0), (2,0) and (4, 6) is _____

A. 18 sq. units

B. 10 sq. units

C. 24 sq. units

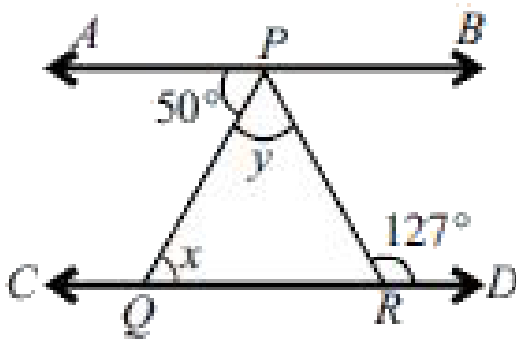
D. 12 sq. units

Answer: D



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3. In the given figure (not drawn to scale), if $AB \parallel CD$, then x and y respectively are _____



A. $40^\circ, 30^\circ$

B. $50^\circ, 77^\circ$

C. $30^\circ, 45^\circ$

D. $90^\circ, 30^\circ$

Answer: B



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4. Which of the following options shows the quotient and remainder when $8x^2 - 4x^2 + x - 3$ is divisible by $x - 2$?

A. Quotient = $8x^2 + 12x + 25$, Remainder = 47

B. Quotient = $4x^2 + 12x - 20$, Remainder = $4x + 2$

C. Quotient = $8x^2 - 10x + 5$, Remainder = 18

D. Quotient = $4x^2 - 6x + 10$, Remainder =

15

Answer: A



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5. Find the value of reciprocal of

$$(a + b)^{-1}(a^{-1} + b^{-1})$$

A. ab

B. a/b

C. $1/ab$

D. $(ab)^2$

Answer: A



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6. The construction of a ΔPQR in which $PQ = 7$ cm, $\angle P = 45^\circ$ is possible when $(QR + PR)$ is

A. 6 cm

B. 7 cm

C. 8 cm

D. 5 cm

Answer: C



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7. If the graph of the equation $3x + 5y = 15$ cuts the coordinate axes at P and Q, then hypotenuse of right triangle POQ is of length

A. $\sqrt{17}$ units

B. 5 units

C. $\sqrt{34}$

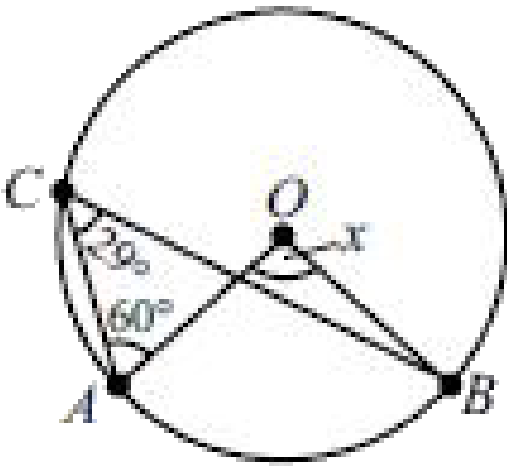
D. 4 units

Answer: C



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8. In the given figure, if O is the centre of the circle, then $x =$ _____



A. 29°

B. 40°

C. 58°

D. 38°

Answer: C



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9. A metallic sheet is of the rectangular shape with dimensions $48\text{cm} \times 36\text{cm}$. From each one of its corners, a square of 8cm is cut off. An open box is made of the remaining sheet. Find the volume of the box.

A. 4280cm^3

B. 2050cm^3

C. 5120cm^3

D. 4690cm^3

Answer: C



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10. Factorise :

$$(x + y + z)^2 - (x - y - z)^2 + 4y^2 - 4z^2$$

A. $(x + 2z)(4x + y - z)$

B. $(x + z)(x + y - 2z)$

C. $4(y + z)(x + y - z)$

D. $2(x + z)(y - 2z)$

Answer: C



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11. The quadrilateral formed by joining the mid-points of the sides of a quadrilateral PQRS, taken in order, is a rectangle, if

A. PQRS is a rectangle

B. PQRS is a parallelogram

C. Diagonals of PQRS are equal

D. Diagonals of PQRS are at right angles

Answer: D



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12. $\frac{a + \sqrt{a^2 - b^2}}{a - \sqrt{a^2 - b^2}} + \frac{a - \sqrt{a^2 - b^2}}{a + \sqrt{a^2 - b^2}}$

A. a^2

B. b^2

C. $a^2 - b^2$

D. $4a^2 - 2b^2$

Answer: D



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13. Find the median and mode respectively of the given data. 24, 17, 24, 26, 13, 18, 25, 19, 16, 20, 28

A. 20,24

B. 20,20

C. 18,24

D. 16,25

Answer: A



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14. Some families having pets were surveyed and the following data recorded.

Number of pets in the family	0	1	2	3
Number of families	42	38	47	23

If a family is chosen at random, then find the probability that it has at least one pet.

A. $\frac{17}{25}$

B. $\frac{18}{25}$

C. $\frac{12}{41}$

D. $\frac{36}{25}$

Answer: B



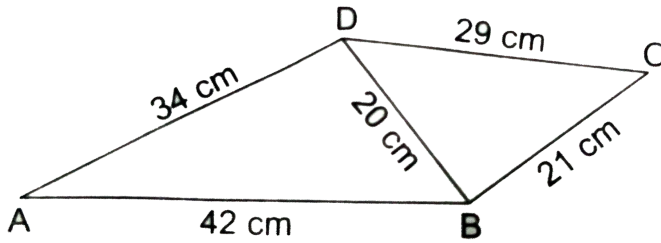
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15. Find the area of the quadrilateral ABCD in

which $AB = 42$ cm.

$Bc = 21cm, CD = 29cm, DA = 34cm$ and

diagonal $BD = 20$ cm .



A. 612cm^2

B. 416cm^2

C. 546cm^2

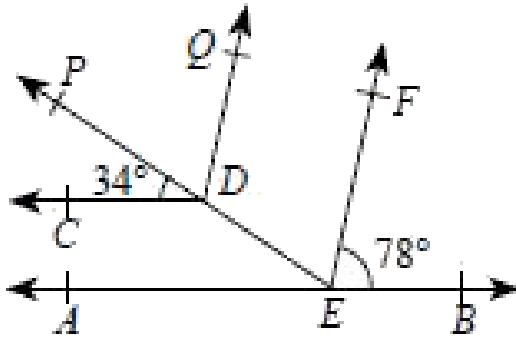
D. 715cm^2

Answer: C



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16. In the given figure, $AB \parallel CD$ and $EF \parallel DQ$, find $\angle PDQ$.



A. 42°

B. 68°

C. 54°

D. 96°

Answer: B



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17. Express $23.\overline{43}$ in the rational form.

A. $\frac{1}{9}$

B. $\frac{2320}{99}$

C. $\frac{14}{85}$

D. $\frac{2310}{87}$

Answer: B



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18. If AD is a median of a $\triangle ABC$ and P is a point on AC such that $\text{ar}(\triangle ADP) : \text{ar}(\triangle ABD) = 2 : 3$, then $\text{ar}(\triangle PDC) : \text{ar}(\triangle ABC)$ is

A. 1 : 6

B. 1 : 5

C. 2 : 5

D. 3 : 5

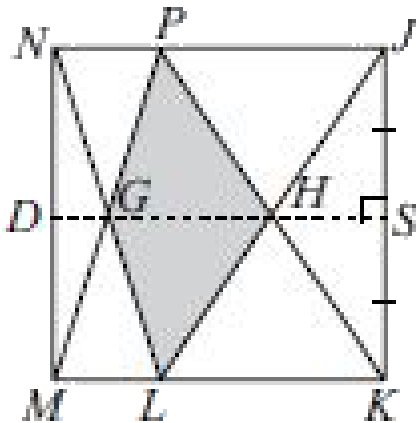
Answer: A



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19. The given figure (not drawn to scale) is a square. $NJ = 20$ cm. $LM = 4$ cm and $PJ = 16$ cm.

Find the area of the shaded region.



A. 180cm^2

B. 100cm^2

C. 115cm^2

D. 99cm^2

Answer: B



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20. The length of a hall is 20m and width 16m .

The sum of the areas of the floor and the flat roof is equal to the sum of the areas of the

four walls. Find the height and the volume of the hall.

A. 6.45 m

B. 7.18 m

C. 8.89 m

D. 9.2

Answer: C



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1. A hemispherical dome of a building needs to be painted from outside. If the circumference of the base of the dome is 17.6 m, then find the cost of painting it at the rate of Rs.8 per 100 cm^2

A. Rs. 35680

B. Rs. 28650

C. Rs. 39424

D. Rs. 40524

Answer: C



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2. 12 years ago, the ratio of age of P to age of Q was 3 : 4. The present age of P is $3\frac{3}{5}$ times of R's present age. If R's present age is 10 years, then what is the Q's present age?

A. 32 years

B. 48 years

C. 44 years

D. 58 years

Answer: C



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3. The average marks in English subject of a class of 24 students is 56. If the marks of three students were misread as 44,45 and 61 of the actual marks , 49,59,67 respectively ,then what would be the correct average ?

A. 57

B. 57.5

C. 55

D. 56.5

Answer: A



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4. If the annual decrease in the population of a town is 15% and the present population of the town is 32000, then what will be the population of the town after 3 years?

A. 21454

B. 18042

C. 19652

D. 19008

Answer: C



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5. In a cricket match , a batsman hits the boundary 5 times out of 40 balls played by him

. Find the probability that the boundary is not hit by the ball.

A. $\frac{1}{8}$

B. $\frac{5}{8}$

C. $\frac{3}{4}$

D. $\frac{7}{8}$

Answer: D



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6. A person has to completely put each of three colours of paint, 162 litres of red paint, 126 litres of blue paint and 180 litres of yellow paint in cans of equal size without mixing any of the three colours of paint such that each can is completely filled. What is the least possible number of cans required?

A. 24

B. 26

C. 28

D. 32

Answer: B



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7. A taxi charges Rs. 25 for the first kilometer and Rs. 12.50 each for every subsequent kilometer. For a distance of p km, an amount of Rs. q is paid. Which of the following shows the linear equation representing the given information?

A. $12.50 p - 12.50 = 1$

B. $25 - 12.50 p = q$

C. $25 + 12.50 p = q$

D. $12.50 p + 12.50 = q$

Answer: D



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8. The perimeter of a triangular field is 540 m and its sides are in the ratio 25 : 17 : 12. Find

the the area of the field. Also, find the cost of ploughing the field at Rs. 5 per m^2 .

A. Rs. 45000

B. Rs. 50000

C. Rs. 48500

D. Rs. 42500

Answer: A



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9. The marked price is 20% higher than cost price. A discount of 20% is given on the marked price. By this type of sale, there is -

A. 4 % gain

B. 4 % loss

C. 2% gain

D. 2% loss

Answer: B



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10. A starts a business with 6000 and B joins the business 4 months later with an investment of Rs. 8000. After one year, they earn a profit of Rs. 34000. Find the share of A in profit.

A. Rs. 18000

B. Rs. 16000

C. Rs. 19000

D. Rs. 15000

Answer: A



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Achievers Section

1. Read the statements carefully and select the correct option.

Statement-1 : If diagonals of a cyclic quadrilateral are diameters of the circle through the vertices of the quadrilateral, then it is a rectangle.

Statement-II : If the sum of a pair of opposite

angles of a quadrilateral is 180° , then the quadrilateral is cyclic.

A. Both Statement-I and Statement-II are true.

B. Both Statement-I and Statement-II are false.

C. Statement-I is true but Statement-II is false.

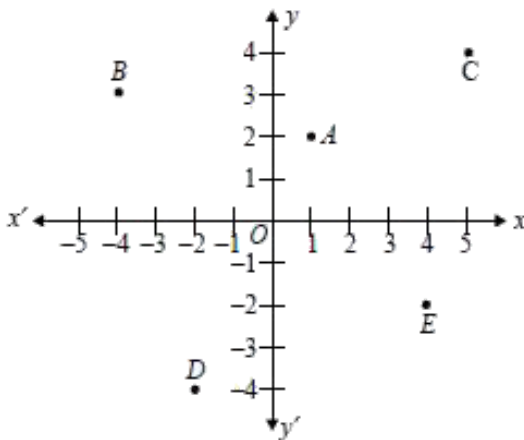
D. Statement-I is false but Statement-II is true.

Answer: A



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2. Study the given co-ordinate system carefully and fill in the blanks.



(i) The sum of abscissa of point A and ordinate

of point E is _____

(ii) The coordinates of point D are _____

(iii) The difference between the ordinates of point B and point C is _____ .



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3. A die is rolled two times simultaneously.

Find the probability of given conditions and

match the following.

	Column I		Column II
P.	Getting a doublet	(i)	$1/12$
Q.	Even number on first die and odd number on second die	(ii)	$1/6$
R.	Sum of numbers on both die is 10	(iii)	$1/4$
A.	$P \rightarrow$ (iii) ; $Q \rightarrow$ (ii) ; $R \rightarrow$ (i)		

A. $P \rightarrow (iii), Q \rightarrow (ii), R \rightarrow (i)$

B. $P \rightarrow (iii), Q \rightarrow (i), R \rightarrow (ii)$

C. $P \rightarrow (ii), Q \rightarrow (iii), R \rightarrow (i)$

D. $P \rightarrow (i), Q \rightarrow (iii), R \rightarrow (ii)$

Answer: C



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4. The sum of length, breadth and depth of a cuboid is 20 cm and the length of its diagonal is 10 cm, then find the surface area of the cuboid.

A. 150cm^2

B. 125cm^2

C. 300cm^2

D. 145cm^2

Answer: C



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5. Read the given statements carefully and state 'T' for true and 'F' for false.

(i) If the mean height of 8 students is 152 cm and two more students of height 143 cm and 156 cm join the group, then the new mean height is 151.5 cm .

(ii) The sum of the maximum and minimum values of a variable is called its range.

(iii) For the given data 15, 11, 17, 15, 18, 19, 21, 15,

18, 21, 17, 15, the mode is 15.

	(i)	(ii)	(iii)
A.	T	T	F
B.	F	T	F
C.	T	F	T
D.	F	F	T



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