



MATHS

BOOKS - HT Olympiad Previous Year Paper

IMO QUESTION PAPER 2020 SET 1

Mathematical Reasoning

1. Simplify :
$$\frac{3^{-3} \times 6^2 \times \sqrt{98}}{5^2 \times \left(\frac{1}{25}\right)^{\frac{1}{3}} \times (15)^{-\frac{4}{3}} \times 3^{\frac{1}{3}}}$$

A. 14

B. $30\sqrt{2}$

C. $28\sqrt{2}$

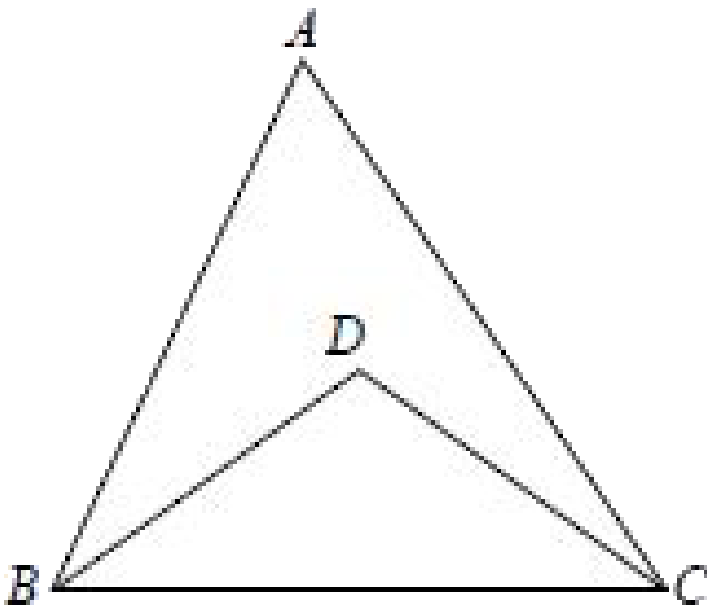
D. 48

Answer: C



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2. In the given figure (not drawn to scale), $AB = AC$ and $DB = DC$. Find the value of $\angle ABD : \angle ACD$.



A. 2 : 3

B. 1 : 1

C. 3 : 2

D. 1 : 2

Answer: B



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3. Which of the following statements is incorrect?

A. Every integer is a rational number.

B. Every natural number is an integer.

C. Every natural number is a real number.

D. Every real number is a rational number.

Answer: D



4. By selling a bike for Rs. 38000, a person loses 20%. For how much should he sell the bike to gain 15%?

A. Rs. 68120

B. Rs. 54625

C. Rs. 47500

D. Rs. 55625

Answer: B



5. For what values of a and b ,
 $x^4 + ax^3 + 2x^2 - 3x + b$ is divisible by
 $x^2 - 1$?

A. $a = 3, b = 4$

B. $a=2, b=4$

C. $a=3, b=-3$

D. $a=1, b=-3$

Answer: C



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6. Find the value of

$$\sqrt[3]{54872} - \sqrt[3]{1728} + \sqrt[3]{15625}$$

A. 51

B. 49

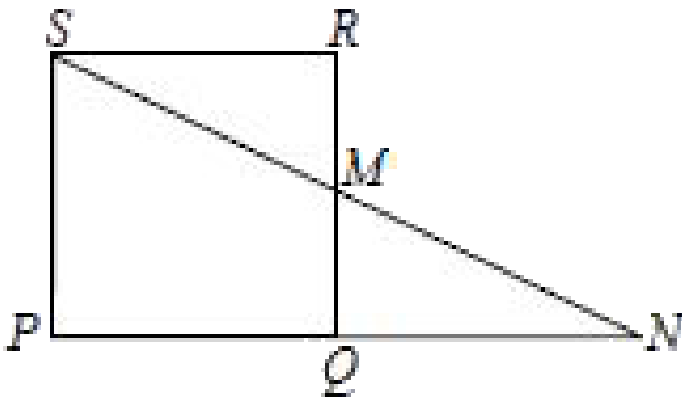
C. 72

D. 58

Answer: A



7. In the adjoining figure, PQRS is a parallelogram and M is mid point of QR. SM and PQ on producing meet at N. Then PN =



A. $\frac{1}{2}PQ$

B. $2PQ$

C. $3PQ$

D. $\frac{2}{3}PQ$

Answer: B



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8. Find the greatest value of n such that the number $1578n$ is divisible by 3.

A. 3

B. 9

C. 6

D. 8

Answer: B



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9. The mean of a set of seven numbers is 81. If one of the number is discarded, then the mean of the remaining numbers is 78. The value of discarded number is

A. 21

B. 48

C. 84

D. 99

Answer: D



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10. Find the point on the graph of the equation $2x + 5y = 18$ whose abscissa is $\frac{1}{2}$ times its ordinate.

A. $(4, 2)$

B. $\left(\frac{3}{2}, 3\right)$

C. $\left(5, \frac{5}{2}\right)$

D. $\left(\frac{7}{2}, 7\right)$

Answer: B



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11. If $\angle A$ and $\angle B$ are complementary angles and $\angle A$ is x , then which equation can be used to find $\angle B$ which is denoted by y ?

A. $y = (90^\circ + x)$

B. $y = (90^\circ - x)$

C. $y = (180^\circ - x)$

D. $y = (x + 180^\circ)$

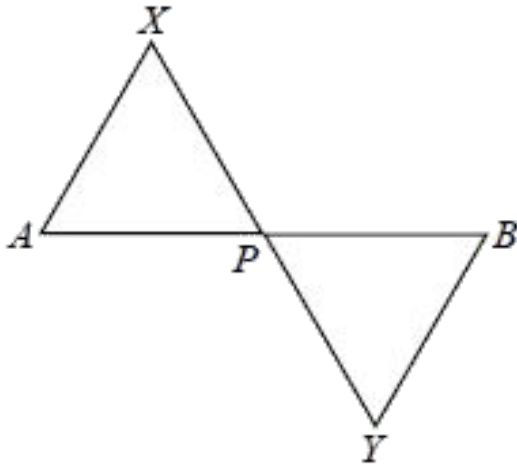
Answer: B



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12. In the given figure, AX and BY are line segments such that $AX \parallel BY$. Which of the

following options is correct?



A. $\triangle APX \cong \triangle BPY$

B. $AP = PB$

C. $\triangle PAX \cong \triangle YPB$

D. $AX = XP$

Answer: B



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13. A solid sphere of radius r is melted and recast into the shape of a solid cone of height r . Find radius of the base of the cone.

A. $3r$

B. r

C. $4r$

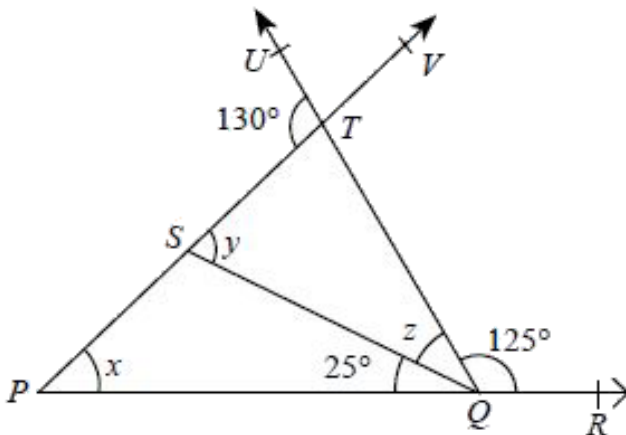
D. $2r$

Answer: D



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14. Find the value of x , y and z respectively in the given figure (not drawn to scale).



A. 110° , 95° , 30°

B. 75° , 100° , 30°

C. 75° , 120° , 40°

D. 115° , 105° , 30°

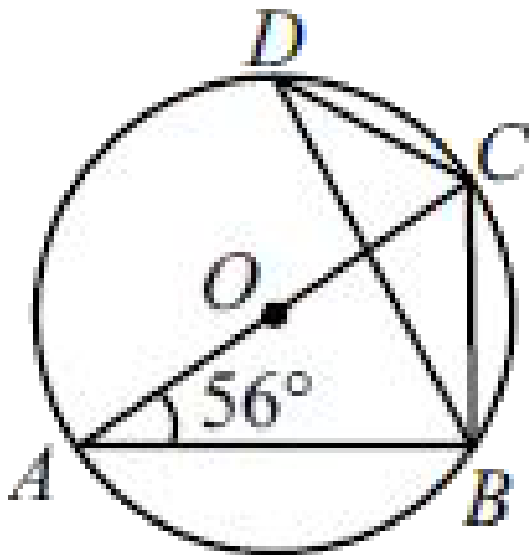
Answer: B



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15. In the given figure, O is the centre of the circle and $\angle BAC = 56^\circ$. The measure of

$\angle BDC$ is _____



A. 46°

B. 40°

C. 56°

D. 50°

Answer: C



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16. _____ measurements can determine a quadrilateral uniquely.

A. 4

B. 3

C. 5

D. 6

Answer: C



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17. The perimeter of an isosceles triangle is 32 cm. The ratio of the equal side to its base is 3 : 2. Find the area of the triangle.

A. $48cm^2$

B. $28\sqrt{3}cm^2$

C. $32\sqrt{2}cm^2$

D. $44cm^2$

Answer: C



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18. Two coins are tossed simultaneously 500 times and we get

No head	108
One head	198
Two heads	194

Find the probability of getting at least one head.

A. $\frac{98}{125}$

B. $\frac{198}{125}$

C. $\frac{195}{500}$

D. $\frac{392}{195}$

Answer: A



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19. Area of rectangle with length

$x^2 + 2xy + y^2$ and breadth $x^2 - 2xy + y^2$ is

A. $x^4 + y^4 - 2x^2y^2$

B. $x^2 + y^2 - 4x^2y^2$

C. $x^4 + y^4 + 2x^2y^2$

D. $x^4 - y^4 + 2x^2y^2$

Answer: A



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20. If the angles A, B, C and D of a quadrilateral ABCD are in the ratio 11 : 19 : 21 : 9, then which of the following is correct?

A. ABCD is a square

B. ABCD is a trapezium with $AD \parallel BC$

C. ABCD is a rectangle

D. Can't be determined

Answer: B



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Everyday Mathematics

1. While solving a mathematical problem, Samidha squared a number and then subtracted 25 from it rather than the required i.e., first subtracting 25 from the number and then squaring it. But she got the right answer. What was the given number? (a) 13 (b) 38 (c) 48 (d) Cannot be determined (e) None of these

A. 48

B. 13

C. 11

D. 19

Answer: B



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2. Mr. Duggal invested 20000 with rate of interest @ 20% per annum. The interest was compounded half-yearly for the first 1year and in the next year it was compounded yearly. What will be the total interest earned at the end of 2 years?

A. Rs. 9040

B. Rs. 8800

C. Rs. 9800

D. Rs. 8040

Answer: A



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3. The average weight of 4 men is increased by 3 kg when one of them who weighs 120 kg is

replaced by another man. What is the weight of new man?

A. 140 kg

B. 150 kg

C. 132 kg

D. 160 kg

Answer: C



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4. A vegetable vendor buys 240 kg of onions for Rs. 380. If 20% of the onion is unusable, at what average price per kilogram must he sell the rest of the onions in order to make a profit of 25%?

A. Rs. 2.47

B. Rs. 3.50

C. Rs. 2.10

D. Rs. 1.47

Answer: A



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5. A solid cylinder of lead 8 m high and 2 m radius is melted and recast into a cone of radius 1.5 m. Find the height of the cone.

A. 16.67 m

B. 21.35 m

C. 42.67 m

D. 31.35 m

Answer: C



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6. A rectangular field has an area $(14x^2 - 11x - 15)m^2$. What could be the possible expression for length and breadth of the field?

A. $(3x - 2)$ m and $(5x + 8)$ m

B. $(7x + 5)$ m and $(2x - 3)$ m

C. $(4x + 2)$ m and $(3x - 7)$ m

D. $(7x - 5)$ m and $(2x - 3)$ m

Answer: B



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7. 8 men can do a piece of work in 20 days, 8 women can do it in 32 days. In how many days will 5 men and 8 women together complete the same work?

A. 10 days

B. 12 days

C. 16 days

D. 18 days

Answer: C



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8. The difference between the ages of two persons is 10 years. 15 years ago the elder one was twice as old as the younger one. The present age of the elder person is

A. 55 years

B. 45 years

C. 35 years

D. 25 years

Answer: C



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9. In an examination it is required to get 55% of the aggregate marks to pass. A Student gets 520 marks and is declared failed by 5%

marks. What are the maximum aggregate marks a student can get ?

A. 960

B. 1050

C. 1205

D. 1040

Answer: D



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10. The probability of selecting a girl from a class is $\frac{3}{8}$ and there are total 360 students in the class. Find the number of boys in the class.

A. 225

B. 135

C. 215

D. 240

Answer: A



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Achievers Section

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

Statement-I : A field is in the shape of quadrilateral ABCD, $\angle C = 90^\circ$, AB = 9 m, BC = 12 m, CD = 5 m and AD = 8 m, then the area of the field is 70 m^2 .

Statement-II: The semi-perimeter of a triangle having sides 13 cm, 14 cm and 15 cm is 21 cm.

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: D



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2. Read the given statements carefully and state T for true and F for false.

(i) The graph of equation $2x + 3y = 0$ passes through the origin.

(ii) The equation $y + 7 = 0$ represents a line that is parallel to the y-axis.

(iii) $x = 5, y = 2$ is a solution of the linear

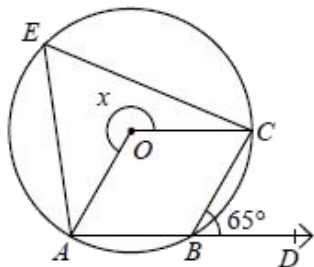
equation $5x + y = 7$.

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

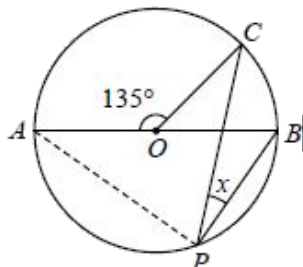


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3. Find the value of x in the given figures.



(i)



(ii)

	(i)	(ii)
A.	180°	40°
B.	210°	35°
C.	230°	22.5°
D.	200°	30°



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4. Divide the polynomials given in Column I and match with the remainders as given in

Column II.

	Column I		Column II
P.	$(x^3 - 6x^2 + 2x - 4)$ by $(x - 1)$	(i)	0
Q.	$(2x^3 - 3x^2 - 17x + 30)$ by $(x - 2)$	(ii)	-7
R.	$(9x^3 - 3x^2 + x - 5)$ by $\left(x - \frac{2}{3}\right)$	(iii)	-3

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

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

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

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

Answer: B



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5. The weight of 15 students are as follows: 31, 28, 35, 29, 27, 32, 41, 38, 37, 40, 43, 34, 36, 32, 30.

Find :

(i) Mean of data

(ii) Median of data

(iii) Mode of data

	(i)	(ii)	(iii)
A.	36	34	30
B.	34.2	30	32
C.	38	32	30
D.	34.2	34	32



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