MATHS

BOOKS - HT Olympiad Previous Year Paper

IMO QUESTION PAPER 2018 SET A

Mathematical Reasoning

1. In a quadrilateral PQRS, diagonals PR and QS bisect each other at M. If $\angle PMS = 90^\circ$, then

quadrilateral PQRS is a____.

A. Trapezium

B. Kite

C. Rhombus

D. Parallelogram

Answer: C

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2. Area of a given triangle is x_1 square units. If the sides of this triangle be doubled, then the area of the new triangle becomes x_2 square units. Find the percentage increase in area.

A. $100\ \%$

B. $200\ \%$

C. $300\ \%$

D. None of these

Answer: C

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3. Consider the given statements carefully.

I. Any point on the x-axis is of the form (0, a).

II. The point (0, 0) lies on both the axes.

III. The point (3, - 2) lies in the IIIrd quadrant.

Which of the above statements is/are true?

A. Both I and II

B. Only I

C. Only II

D. Both II and III

Answer: C

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4. If $(3, -1)$ is a solution of the linear equation $4x - ky = 8x + 2y$, then find the value of k.

A. 11

B. 13

C. 10

D. 15

Answer: C

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5. Which of the following statements is INCORRECT?

A. Things which coincide with one another are equal to one another.

B. Two distinct lines can have more than one point in common.

C. A circle can be drawn with any centre and any radius.

D. A straight line may be drawn from any one point to any other point.

Answer: B

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6. A bag contains 8 yellow, 3 pink, 2 green and 7 red candies of similar size. A candy is taken out randomly from the bag. What is the

probability that the chosen candy is of red colour?

A. $\frac{1}{4}$

B. $\frac{3}{20}$

C. $\frac{7}{20}$

D. $\frac{4}{5}$

Answer: C

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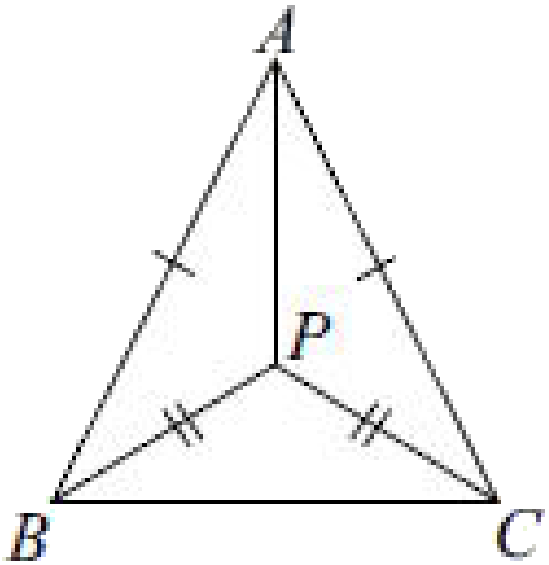
7. In the given figure, ΔABC and ΔPBC are two isosceles triangles on the same base BC and vertices A and P are on the same side of BC. If A and P are joined, then



A. $\angle BPA = \frac{1}{2}\angle BAC$

B. $\angle BAP = \frac{1}{2}\angle BAC$

C. $\angle CPA = \frac{1}{2}\angle BAC$

D. $\angle BAP = 2an \geq lBAC$

Answer: B

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8. The volume of a cylinder of radius r is $\frac{1}{4}$ of the volume of a rectangular box with a square base of side length x. If the cylinder and the

box have equal heights, what is r in terms of x? $\frac{x^2}{2\pi}$ (b) $\frac{x}{2\sqrt{\pi}}$ (c) $\frac{\sqrt{2x}}{\pi}$ (d) $\frac{\pi}{2\sqrt{x}}$

A. $\frac{x^2}{2\pi}$ units

B. $\frac{x}{2\sqrt{\pi}}$ units

C. $\frac{\sqrt{2x}}{\pi}$ units

D. $\frac{x}{\sqrt{\pi}}$ units

Answer: B

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9. What cou ld be the possible values of X , if 2345691X32 is divisible by 3 (where X is a digit)?

A. 1

B. 4

C. 7

D. All of these

Answer: D

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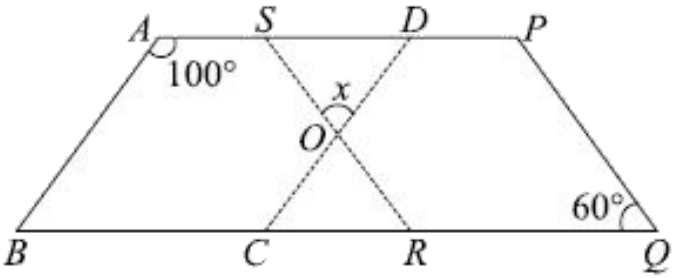
10. In the given figure (not drawn to scale), ABCD and PQRS are parallelograms. Find the value of x .



A. 70°

B. 80°

C. 30°

D. 40°

Answer: D

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11. The denominator of $\frac{a+\sqrt{a^2-b^2}}{a-\sqrt{a^2-b^2}}+\frac{a-\sqrt{a^2-b^2}}{a+\sqrt{a^2-b^2}}$ is _____.

A. a^2

B. b^2

C. a^2-b^2

D. $\frac{4a^2-2b^2}{b}$

Answer: B

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12. If $p = 2 - \sqrt{3}, q = \sqrt{3} - \sqrt{7}$ and $r = \sqrt{7} - \sqrt{4}$, then find the value of $p^3 + q^3 + r^3$.

A. 0

B. $3\left(3\sqrt{3} + \sqrt{7} - 8\right)$

C. $3\sqrt{3} - 2\sqrt{7}$

D. None of these

Answer: B

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13. Three identical spherical balls fit snugly into a cylindrical can. The radius of each of the spherical ball equals the radius of the can and the balls just touch the bottom and the top of the can. What fraction of the volume of the can is taken up by the balls?

A. $\frac{3}{5}$

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

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

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

Answer: D

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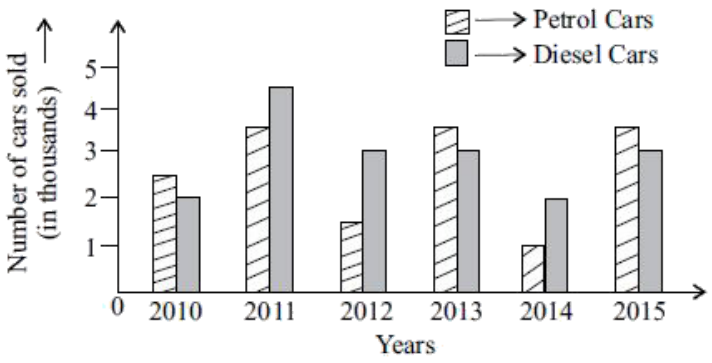
14. Direction : The given bar graph represents the petrol and diesel cars sold in a mega city from 2010 to 2015 . Study the graph carefully and answer the following questions.



Find the difference between the number of petrol cars sold in 2010 and 2011 together and the number of diesel cars sold in 2015.

A. 3200

B. 2800

C. 2500

D. 3000

Answer: D

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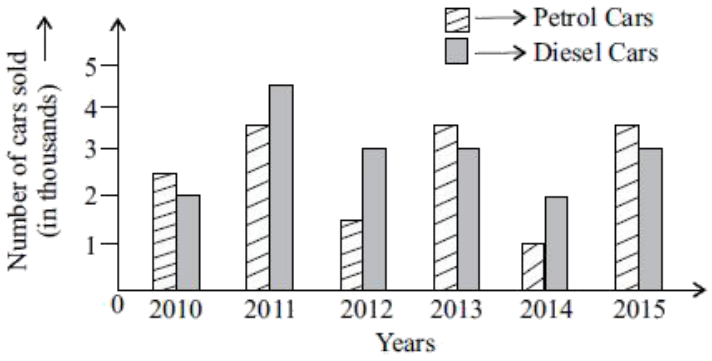
15. Direction : The given bar graph represents the petrol and diesel cars sold in a mega city from 2010 to 2015 . Study the graph carefully and answer the following questions.



In which year, the total sale of petrol and diesel cars altogether was maximum?

A. 2012

B. 2011

C. 2013

D. 2014

Answer: B

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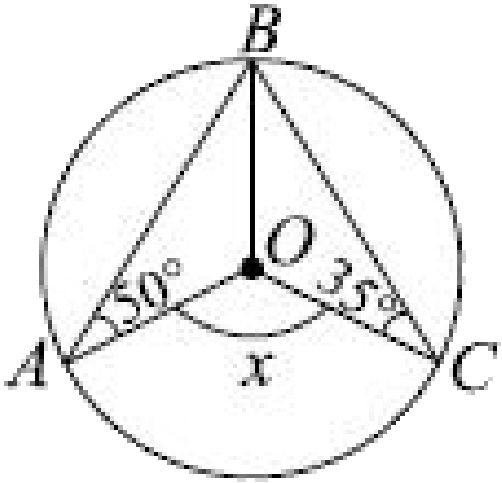
16. In the given figure (not drawn to scale), AB and BC are two chords of the circle with centre O. Find the value of x.



A. 170°

B. 70°

C. 150°

D. None of these

Answer: A

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17. Study the given statements carefully and select the correct option.

P. Two congruent figures have equal areas and vice versa.

Q. Parallelograms on the same base (or equal

bases) and between the same parallels are equal in area.

R. If a parallelogram and a triangle are on the same base and between the same parallels, then area of the triangle is equal to the area of the parallelogram.

S. Triangles on the same base (or equal bases) and having equal areas lie between the same parallels.

A. Only P and Q are true.

B. Only Q and S are true.

C. Only P and R are false

D. Both B and C

Answer: D

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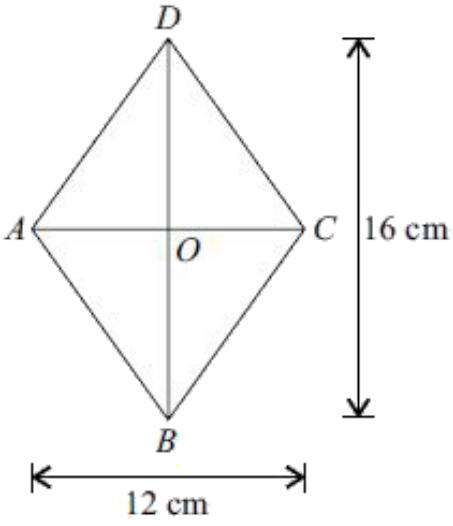
18. In the given figure, ABCD is a rhombus whose diagonals intersect at O. If E and F are mid-points of AO and BO respectively, then

find the length of EF.



A. 10 cm

B. 5 cm

C. 8 cm

D. 9 cm

Answer: B

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19. The traffic police recorded the speed (in km/hr) of 10 motorcyclists as 32, 45, 46, 55, 65 , 38, 45, 41 , 39 and 62. Later on, an error in recording instrument was found. Find the correct average speed of the motorcyclists, if the instrument recorded 3 km/hr less in each case.

A. 49.9 km/hr

B. 48.5 km/hr

C. 43.8 km/hr

D. 49.8 km/hr

Answer: D

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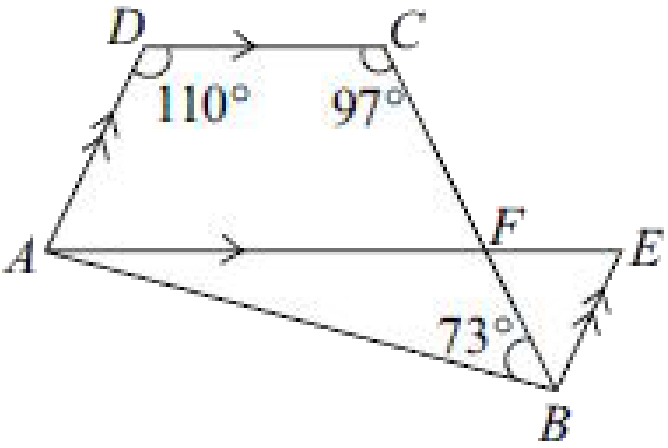
20. In the given figure (not drawn to scale), ABCD is a quadrilateral. If $AEIIDC, BEIIAD$ and AE intersects BC

at F, the find $\angle EBF$.



A. 43°

B. 72°

C. 51°

D. 27°

Answer: D

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Everyday Mathematics

1. Amit scored 73 marks in Mathematics. He scored 56% marks in English and x marks in Science. Maximum marks in each subject were 150. The overall percentage of marks obtained by him was 54%. How many marks did he score in Science?

A. 84

B. 86

C. 89

D. 73

Answer: B

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2. A box contains 125 adapter chargers out of which 45 are defective and rest are good. Priyanka will buy a charger, if it is good. The shopkeeper draws one charger at random and

gives it to her. What is the probability that she will buy it?

A. $\frac{9}{25}$

B. $\frac{16}{25}$

C. $\frac{4}{25}$

D. None of these

Answer: B

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3. Of the four members, the first is twice the second, the second is one-third of the third and the third is 5 times the fourth. The average of the numbers is 24.75. The largest of these numbers is (a) 9 (b) 25 (c) 30 (d) None of these

A. 9

B. 25

C. 30

D. None of these

Answer: D

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4. A man gets a simple interest of Rs. 2500 on a certain principal at the rate of 10% per annum in 5 years . What compound interest will the man get on twice the principal in two years at the same rate?

A. Rs. 1500

B. Rs. 2100

C. Rs. 1750

D. Rs. 1350

Answer: B

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5. A three-wheeler scooter charges Rs. 15 for the first kilometer and Rs. 7.50 each for every subsequent kilometer. For a distance of x km, an amount of Rs. y is paid. Which of the

following shows the linear equation representing the given information?

A. $7.50x - 7.50 = y$

B. $15 + 7.50x = y$

C. $7.50x + 7.50 = y$

D. $15 - 7.50x = y$

Answer: C

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6. Along a path, 25 conical pillars are constructed. Each pillar has radius 15 cm and height 20 cm. Find the total cost of painting these pillars at the rate of Rs. 50 per cm^2. [Take $\pi = 3.14$]

A. Rs. 201752.50

B. Rs. 2052325

C. Rs. 3214325.50

D. Rs. 1471875

Answer: D

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7. Two spinning machines A and B can together produce 50000 m of cloth in 20 hours. If machine B alone can produce the same amount of cloth in 25 hours, then how much cloth can machine A produce alone in 20 hours?

A. 18000 m

B. 15000 m

C. 10000 m

D. 25000 m

Answer: C

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8. The traffic light at three different signal points change after every 15 seconds, 30 seconds and 45 seconds respectively. If all change simultaneously at 8: 15 :20 hours, then when will they again change simultaneously?

A. 8:16:20 hours

B. 8:18:35 hours

C. 8:18:45 hours

D. 8:16:50 hours

Answer: D

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9. A person at first has enough money to buy 80 sunglasses worth Rs. 700 each. If the cost of each sunglasses gets increased by Rs. 50,

then how many sunglasses can he buy with the same amount of money (approx.).

A. 80

B. 74

C. 82

D. 75

Answer: B

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10. The manufacturer of a machine sells it to a trader making a profit of 15% on its manufacturing cost, the trader sells it to the vendor, making a profit of 5% and vendor sell it to the actual user at a profit of 10%. If the actual user pays Rs. 531.30 for it, then find the manufacturing cost.

A. Rs. 400

B. Rs. 800

C. Rs. 600

D. Rs. 360

Answer: A

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Achievers Section

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

Statement-I : A rectangular tank is 80 m long and 25 m broad. Water flows into it through a

pipe whose cross-section is $25\ \text{cm}^2$, at the rate of 16 km per hour. The rise in the level of water in the tank in 45 minutes is 2.5 cm.

Statement-II : If V is the volume of cuboid of dimensions a, b and c and A is its surface area, then $\frac{A}{V} = 2[a + b + c]$.

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

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

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

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

Answer: D

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2. ABC is a triangle. D is a point on AB such that $AD = \frac{1}{4}AB$ and E is a point an AC such that $AE = \frac{1}{4}AC$. Then $DE =$ _____

A. BC

B. 2 BC

C. $\frac{1}{4}$ BC

D. $\frac{1}{2}$ BC

Answer: C

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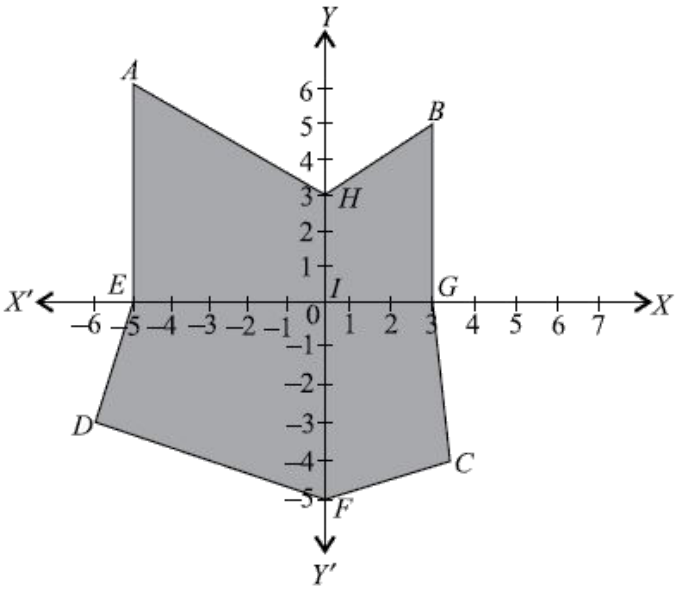
3. Study the given co-ordinate system carefully.

Which of the following options hold true?



P. The coordinates of points B and D are $(3, -5)$ and $(-6, -3)$ respectively.

Q. Point A is at the distance of 6 units from y-axis.

R. BG is parallel to y-axis.

S. Point E and G lie on x-axis.

A. Only P and S

B. Only P and Q

C. Only R and S

D. P, Q, R and S

Answer: C

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4. Match the following:

	Column-I		Column-II
P.	The value of m for which $\left[\left\{\left(\frac{1}{3^2}\right)^{-3}\right\}^{\frac{-1}{2}}\right]^{\frac{1}{9}} = 3^m$, is	(a)	3
Q.	If $x = 3 - 2\sqrt{2}$, then $\sqrt{x} - \frac{1}{\sqrt{x}} =$ _____.	(b)	$\frac{-1}{3}$
R.	If $x = 2 + \sqrt{3}$, then $\left(x^2 + \frac{1}{x^2}\right)^2 =$ _____.	(c)	± 2
S.	If $\left(\frac{a}{b}\right)^{x-2} = \left(\frac{b}{a}\right)^{x-4}$, then $x =$ _____.	(d)	196

A. P $\rightarrow$ (b), Q $\rightarrow$ (c), R $\rightarrow$ (d), S $\rightarrow$ (a)

B. P $\rightarrow$ (c), Q $\rightarrow$ (b), R $\rightarrow$ (a), S $\rightarrow$ (d)

C. P $\rightarrow$ (d), Q $\rightarrow$ (a), R $\rightarrow$ (c), S $\rightarrow$ (b)

D. P $\rightarrow$ (a), Q $\rightarrow$ (b), R $\rightarrow$ (d), S $\rightarrow$ ©

Answer: A

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5. A die having numbers 1, 2, 4, 6, 7 and 8 on its faces, is rolled once. Find the probability of getting

(i) an even prime number.

(ii) a number greater than 3.

(iii) a multiple of 2 which is less than 4.

	(i)	(ii)	(iii)
A.	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{2}{3}$
B.	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$
C.	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{6}$
D.	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{1}{6}$

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