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Class: X
Subject: Mathematics
Topic: ASK1510SA1
No. of Questions: 30

Q1. The least number which is a perfect square and is divisible by each of 16, 20 and 24 is

(a) 240
(b) 1600
(c) 2400
(d) 3600

Sol. (d)

The L.C.M. of 16, 20 and 24 is 240. The least multiple of 240 that is a perfect square is 3600 and also we can easily eliminate choice (1) and (3) since they are not perfect number.

Q2. If n is an even natural number, then the largest natural number by which $n(n+1)(n+2)$ is divisible is

(a) 6
(b) 8
(c) 12
(d) 24

Sol. (d)

Out of n and $n+2$, one is divisible by 2 and the other by 4, hence $n(n+2)$ is divisible 8. Also $n, n+1, n+2$ are three conseceutive numbers, hence one of them is divisible by 3. Hence $n(n+1)(n+2)$ must be divisible by 24. This will be true for any even number n.

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Passages

LCM of several fraction $= \frac{\text{LCM of their numerators}}{\text{HCF of their denominators}}$

HCF of several fractional $= \frac{\text{HCF of their numerators}}{\text{their denominotors}}$

Q3. The L.C.M. of the fractions $\frac{5}{16}, \frac{15}{24}$ and $\frac{25}{8}$ is

(a) $\frac{5}{48}$
(b) $\frac{5}{8}$
(c) $\frac{75}{48}$
(d) $\frac{75}{8}$

Sol. (d)

$\text{L.C.M. of} \frac{5}{16}, \frac{15}{24} \text{ and} \frac{25}{8} = \frac{\text{L.C.M.of numberators}}{\text{H.C.F.of denominators}}$

L. C. M. of 5, 15 and 25 is 75.

H.C.F. of 16, 24 and 8 is 8.

Q4 The H.C.F. of $\frac{2}{5}, \frac{6}{25}, \frac{8}{35}$ is

(a) $\frac{2}{5}$
(b) $\frac{24}{5}$
(c) $\frac{2}{175}$
(d) $\frac{24}{175}$

Sol. (c)

$\text{H. C. F of the fractions} = \frac{\text{H.C.F of numerators}}{\text{L.C.M.of denomiantors}}$

H.C.F. of 2, 6, and 8 is 2.

L.C.M. of 5, 25 and 35 is 175.

Q5. The H.C.F. of the fractions $\frac{8}{21}, \frac{12}{35}$, and $\frac{32}{7}$ is

(a) $\frac{4}{105}$
(b) $\frac{192}{7}$
(c) $\frac{4}{7}$
(d) $\frac{5}{109}$

Sol. (a)

H.C.F. of given fraction is

$$= \frac{\text{H.C.F.of } 8,12,32}{\text{L.C.M.of } 21,35,7} = \frac{4}{105}$$

Q6. A positive integer is said to be a prime if it is not divisible by any positive integer other than itself and one. Let p be a prime number strictly greater than 3. Then, when $p^2 + 17$ is divided by 12, the remainder is –

(a) 6
(b) 1
(c) 0
(d) 8

Sol. (a)

The square of any prime greater than 3, when divided by 12 leaves a remainder 1. p^2 when divided by 12 leaves a remainder of 1, and 17 when divided by 12 leaves a remainder of 5. So $p^2 + 17$ when divided by 12 leaves a remainder of 6.

Q7. If $(x - 3), (x - 3)$ are factors of $x^3 - 4x^2 - 3x + 18$; then the other factor is:

(a) $x + 2$
(b) $x + 3$
(c) $x - 2$
(d) $x + 6$

Sol. (a) Satisfy x = -2 in the given polynomial

Q8. If $x = 0.\overline{7}$, then 2x is –

(a) $1.\overline{4}$
(b) $1.\overline{5}$
(c) $1.\overline{54}$
(d) $1.\overline{45}$

Sol. (b)

$10x = 7.\overline{7}$ or $x = 0.\overline{7}$

Subtracting, $9x = 7$ $\therefore x = \frac{7}{9}$

$2x = \frac{14}{9} = 1.555 \dots \dots 1.\overline{5}$

Passage II

If α, ß γ are the zeroes of $ax^3 + bx^2 + cx + d$, then

$$\sum \alpha = -\frac{b}{a}, \sum \alpha ß = \frac{c}{a}, \alpha ß \gamma = -\frac{d}{a}$$

Q9. If α, ß, γ are the zeroes of $x^3 - 5x^2 - 2x + 24$ and $\alpha ß = 12$, then = γ

(a) 2
(b) -2
(c) 3
(d) -3

Sol. (b)

Q10. If $a - b, a, a + b$ are the roots of $x^3 - 3x^2 + x + 1$, then $a + b^2 =$

(a) 3
(b) 4
(c) 5
(d) 2

Sol. (a) a = 1 and b = sqrt(2)

Q11. If two zeroes of the polynomial $x^3 - 5x^2 - 16x - 16x + 80$ are equal in magnitude but opposite in sign, then zeroes are

(a) $4, -4, 5$
(b) $3, -3, 5$
(c) $2, -2, 5$
(d) $1, -1, 5$

Sol. (a) Apply summation of roots and product of roots formula

Q12. A motor boat takes 2 hours to travel a distance 9 km. down the current and it takes 6 hours to travel the same distance against the current. The speed of the boat in still water and that of the current (in km/hour) respectively are –

(a) 3, 1, 5
(b) 3, 2
(c) 3.5, 2.5
(d) 3, 1

Sol. (a)

Down rate $= 9 \div 2 = 4.5 \text{ km/hr}$

Uprate $= 9 \div 6 = 1.5 \text{ km/hr}$

Speed of the boat $= (4.5 + 1.5) \div 2 = 3 \text{ km/hr}$

Speed of the current $= (4.5 - 1.5) \div 2 = 1.5 \text{ km/hr}$

Q13. x & y are 2 different digits. If the sum of the two digit numbers formed by using both the digits is a perfect square, then value of $x + y$ is

(a) 10
(b) 11
(c) 12
(d) 13

Sol. (b)

The numbers that can be formed are xy and yx. Hence $(10x + y) + (10y + x) = 11(x + y)$. If this is a perfect square then $x + y = 11$.

Passage II

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A system of linear equations is given as follows:

$a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$

Q14. Condition for two lines to have a unique solution is

(a) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$
(b) $\frac{a_1}{a_2} \neq \frac{c_1}{c_2}$
(c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
(d) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Sol. (b)

Q15. Condition for two lines to have infinitely many solutions is

(a) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
(b) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$
(c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
(d) None of these

Sol. (a)

Q16. Both lies are parallel only if

(a) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$
(b) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
(c) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$
(d) None of these

Sol. (b)

Q17. The area of a right angled triangle is 40 sq. cm. and its perimeter is 40 cm. The length of tis hypotenuse is –

(a) 16 cm.
(b) 18 cm.
(c) 17 cm.
(d) Data Insufficient

Sol. (b)

Q18. It is given that $\Delta ABC \sim \Delta PQR$ with $\frac{BC}{QR} = \frac{1}{3}$. Then $\frac{ar\ (\Delta PRQ)}{ar\ (\Delta BCA)}$ is equal to

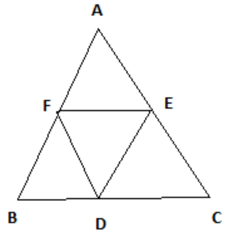
(a) 9
(b) 3
(c) $\frac{1}{3}$
(d) $\frac{1}{9}$

Sol. (a)

Since, $\Delta ABC \sim \Delta PQR$

$$\therefore \frac{ar\ (\Delta\ PQR)}{ar\ (\Delta BCA)} = \frac{PR^2}{AC^2} = \frac{PQ^2}{AB^2} = \frac{QR^2}{BC^2} = \frac{9}{1} \left[\because \frac{QR}{BC} = \frac{3}{1}\right] = 9$$

Q19. In triangle ΔABC, D, E, F are points of trisection of BC, AC and AB respectively. Which of the following statement is not true?



(a) Area ΔEDC = 2/9 area ΔABC
(b) Area ΔFBD = 2/7 area ΔFDC
(c) Area ΔDEF = 2/9 area ΔABC
(d) Area $(\Delta EDC + \Delta DBF + \Delta AFE) = 2$ area ΔDEF

Sol. (d)

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In triangle ΔABC, DB = DC

⟹ ∠DBC = ∠DCB = $\left(\frac{180°-60°}{2}\right) = 60°$

In ΔABC, AB, = AC

⟹ ∠ABC = ∠ACB = $\left(\frac{180°-30°}{2}\right) = 75°$

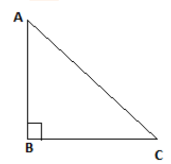
Or ∠EBD = 75° – 60° = 15°

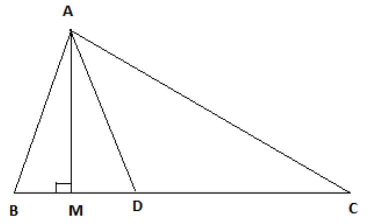
Also in ΔDEB, ∠BDE = 120°

∴ ∠BED = 180° $-(120° + 15°) = 45°$

Passage Based Question

In Figure, AD is a median of a triangle ABC and AM ⊥ BC.





Q20. $AD^2 + BC.DM + \left(\frac{BC}{2}\right)^2$

(a) AC^2

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(b) AB^2
(c) BC^2
(d) None of these

Sol. (a)

AD is the median, so D is the mid-point of BC.

So $BD = DC = \frac{1}{2}BC$ ....(1)

In right angled $\Delta AMC, AC^2 = AM^2 + MC^2$ ....(2)

In right angled ΔAMD, $AM^2 = AD^2 - MD^2$ ....(3)

Putting AM^2 from (3) in (2), we get

$AC^2 = AD^2 - MD^2 + MC^2 = AD^2 - MD^2 + (MD + DC)^2$

$= AD^2 + 2DM.\frac{BC}{2} + \left(\frac{BC}{2}\right)^2$

So, $AC^2 = AD^2 + BC.DM + \left(\frac{BC}{2}\right)^2$

Q21. $AD^2 - BC.DM + \left(\frac{BC}{2}\right)^2$

(a) AC^2
(b) AB^2
(c) BC^2
(d) None of these

Sol. (b)

In right angled ΔABM, $AB^2 = AM^2 + BM^2$

From $\Delta AMD, AM^2 = AD^2 - MD^2$

So $,AB^2 = AD^2 - MD^2 + BM^2 = AD^2 - MD^2 + (BD - MD)^2 = AD^2 - MD^2 + BD^2 - 2BD.MD + MD^2$

Q22. $2\,AD^2 + \frac{1}{2}BC^2$

(a) $AC^2 + BC^2$
(b) $AB^2 + BC^2$
(c) $AC^2 + AB^2$
(d) None of these

Sol. (c)

From the solution of above two questions

$AC^2 = AD^2 + BC.DM + \left(\frac{BC}{2}\right)^2$ …… (i)

And $AB^2 = AD^2 - BC.DM + (BC/2)^2$ …….. (II)

Adding results of (i) & (ii) we get,

$\Rightarrow \quad AC^2 + AB^2 = 2AD^2 + \frac{1}{2}(BC)^2$

Q23. The value of $\left(\sin^2 7\frac{1}{2}{}^\circ + \cos^2 7\frac{1}{2}{}^\circ\right) - (\sin^2 30^\circ + \cos^2 30^\circ) + (\sin^2 7^\circ + \sin^2 83^\circ)$ is equal to

(a) 3
(b) $3\frac{1}{2}$
(c) 2
(d) 1

Sol. (d)

$\sin 83^\circ = \cos 7^\circ$

$\therefore$ the given expression is $1 - 1 + 1 = 1$

Q24. A circular wire of radius 7 cm is cut and bend again into an arc of a circle of radius 12 cm. The angle subtended by the arc at the centre is –

(a) 50°
(b) 210°
(c) 100°
(d) 60°

Sol. (b)

Given that diameter of circular wire = 14 cm.

Therefore, length of circular wire = 14π cm

∴ required angle

$$= \frac{\text{arc}}{\text{radius}} = \frac{14\text{p}}{12} = \frac{7\text{p}}{6} = \frac{7}{6}\text{p}.\frac{180°}{\text{p}} = 210°$$

Q25. If $\sin\theta = \frac{24}{25}$ and θ lies in the second quadrant, then $\sec\theta + \tan\theta =$

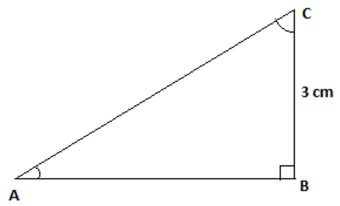
(a) –7
(b) 6
(c) 4
(d) –5

Sol. (a)

$$\sec\theta + \tan\theta = \frac{-25}{7} + \frac{-24}{7} = -7$$

Passage I

In ΔABC, right angled at B



$AB + AC = 9$ cm and $BC = 3$cm.

Q26. The value of $\cot C$ is

(a) $\frac{3}{4}$
(b) $\frac{1}{4}$
(c) $\frac{5}{4}$
(d) None

Sol. (a)

$\text{Cot}\, C = \frac{AC}{AB} = \frac{3}{4}$

Q27. The value of $\sec C$ is

(a) $\frac{4}{3}$
(b) $\frac{5}{3}$
(c) $\frac{1}{3}$
(d) None

Sol. (b)

$\sin C = \frac{AC}{BC} = \frac{5}{3}$

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Q28. $\sin^2 C + \cos^2 C =$

(a) 0
(b) 1
(c) –1
(d) None

Sol. (b)

$\sin C = \frac{4}{5}$

$\cos C = \frac{3}{5}$

$\text{L.H.S} = \sin^2 C + \cos^2 C = \left(\frac{4}{5}\right)^2 + \left(\frac{3}{5}\right)^2 = \frac{16+9}{25} = 1 = \text{R.H.S}$

Q29. The mean of five numbers is 18. If one number is excluded, then their mean is 16, the excluded number is ______.

(a) 24
(b) 26
(c) 28
(d) 25

Sol. (b)
5*18-4*16 = 26

Q30. The mean of $\frac{1}{3}, \frac{3}{4}, \frac{5}{6}, \frac{1}{2}$ and $\frac{7}{12}$, is _____.

(a) $\frac{2}{5}$
(b) $\frac{3}{5}$
(c) $\frac{1}{5}$
(d) None of these

Sol. (b)
Add all and divide by 5.