



Rao IIT Academy

Symbol of Excellence and Perfection

JEE | MEDICAL-UG | BOARDS | KVPY | NTSE | OLYMPIADS

Date : 11 - 12 - 2016

Std. : VIIIth Std.

GANIT PRABHUTWA EXAMINATION SOLUTIONS

Q. 1 (C)

□ PQRS is cyclic Quadratic

∴ Sum of opposite angles is 180° .

$$\Rightarrow \angle P + \angle R + 180^\circ$$

$$\Rightarrow 2x + 50 + x - 30 = 180$$

$$\Rightarrow 4x = 160$$

$$x = 40^\circ$$

$$\angle R = 2x - 30$$

$$= 80 - 30$$

$$= 50^\circ$$

2. (B)

$$(6.2) \times 10^{12} \div (5 \times 10^{11})$$

$$= \frac{6.2}{5} \times 10^{12-11}$$

$$= \frac{62}{5}$$

3. (B)

$$64 \% \text{ of } 1600 = 80\% \text{ of } x$$

$$\Rightarrow \frac{64}{100} \times 1600 = \frac{80}{100} \times x$$

$$\Rightarrow x = 1280$$

4. (A)

$$a : b = 4 : 7$$

$$b : c = 5 : 8$$

$$\frac{a}{b} = \frac{4}{7}$$

$$\frac{b}{c} = \frac{5}{8}$$

$$a:c = \frac{a}{c} = \frac{a}{b} \times \frac{b}{c} = \frac{4}{7} \times \frac{5}{8}$$

$$= \frac{5}{14}$$

$$a:c = 5:14$$

5. (A)

$$\text{Purchasing price} = 20,000 - \frac{15}{100} \times 20,000$$

$$= 20,000 - 3000$$

$$= 17000$$

6. (D)

60A18 is divisible by 3.

\therefore By divisibility test of 3, the sum of all the digits of the given number should be divisible by 3 as well

$$\therefore 6+0+A+1+8 = 15+A$$

$15+A$ should be divisible by 3.

$\therefore 0$ or 3 or 6 or 9 can be the possible value of A .

7. (B)

Numbers are

$$x, x+1, x+2, x+3, x+4$$

$$\text{Average} = \frac{x+x+1+x+2+x+3+x+4}{5}$$

$$= \frac{5x+10}{5} = x+2$$

8. (B)

$$\sqrt{156816} = 396$$

$$\text{To find } \sqrt{15.6816 \times 10^{-2}}$$

$$= \sqrt{156816 \times 10^{-6}}$$

$$= \sqrt{156816} \times \sqrt{10^{-6}}$$

$$= 396 \times 10^{-3}$$

$$= 0.396$$

9. (A)

Sum of all exterior angle of any polygon is 360°

10. (D)

Diameter of such a

Circle = side of the square

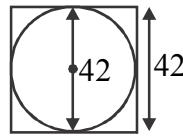
$$= 42$$

$$\text{radius} = \frac{42}{2} = 21$$

Area of circle = πr^2

$$= \frac{22}{7} \times 21 \times 21$$

$$= 1386 \text{ cm}^2$$



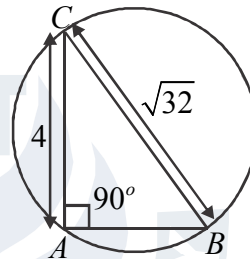
(B)

1. Sides of triangle are 4, 4, $\sqrt{32}$

Clearly as $\sqrt{4^2 + 4^2} = \sqrt{32}$

the given Δ is right angle thus $BC = \sqrt{32}$ is the diameter of circumcircle

$$\therefore r = \frac{\sqrt{32}}{2} = 2\sqrt{2}$$



2. $27 \div 9 \times (3 - 5) + 2 = -4$

3. Angles of Quadrilateral are :

$$72^\circ, 72^\circ, 108^\circ, 108^\circ$$

Sum of opposite angles = $72 + 108 = 180^\circ$

It is a cyclic quadrilateral

4. let the distance be d

and time taken by three runners be $3x$, $5x$, and $4x$

$$S_1 = \frac{d}{3x} \quad S_2 = \frac{d}{5x} \quad S_3 = \frac{d}{4x}$$

$$S_1 : S_2 : S_3 = \frac{d}{3x} : \frac{d}{5x} : \frac{d}{4x}$$

$$= 20 : 12 : 15$$

5. Let the principal be P

$$\text{Instrest} = \frac{prt}{100}$$

$$\frac{9}{16} \cdot p = \frac{p \times r^2}{100} \text{ as } r = t$$

$$\Rightarrow r = \sqrt{\frac{900}{16}} = \frac{30}{4} = 7.5$$

Q. 2

1. $6p^2 + 4p - 17 + 4p^2 - 7p + 10$
 $= 10p^2 - 3p - 7$

Required expansion $= 10p^2 - p + 11 - (10p^2 - 3p - 7)$
 $= 2p + 18$

2. Factorize : $27y^3 + 8x^3$

$$= (3y)^3 + (2x)^3$$

$$= (3y + 2x)(9y^2 + 4x^2 - 6xy)$$

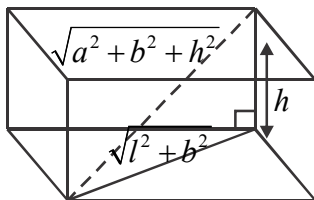
3. $x^2 - 4x + 1 = 0$

$$x + \frac{1}{x} = 4$$

$$x^2 + \frac{1}{x^2} + 2 = 16$$

$$x^2 + \frac{1}{x^2} = 14$$

4.



Diagonal of box $= \sqrt{12^2 + 9^2 + 8^2}$

$$= \sqrt{144 + 81 + 64}$$

$$= \sqrt{289}$$

$$= 17$$

5. $CE \perp AB$

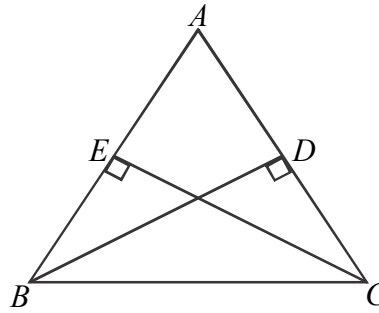
$BD \perp AC$

To prove $\triangle ABD \sim \triangle ACE$

Consider $\triangle ABD$ and $\triangle ACE$

$\angle ADB = \angle AEC = 90^\circ$

$\angle BAD = \angle CAE$ (common angle)



Since the two angles are equal. The third angle has to be equal

$\therefore \triangle ABD \sim \triangle ACE$

Q. 3

1. Given

$a = b^{2x}$

$b = c^{2y}$

$c = a^{2z}$

Now as,

$c = 2^{2z}$

$= (b^{2x})^{2z}$

$= b^{4xz}$

$C^1 = C^{8xyz}$

$\Rightarrow 8xyz = 1$

$\Rightarrow xyz = \frac{1}{8}$

2. Work done by B in one day = $\frac{1}{18}$

Work done by A in one day = $2 \times \frac{1}{18}$

$= \frac{1}{9}$

Work done by A and B together in one day

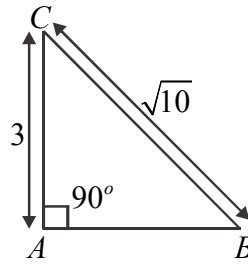
$= \frac{1}{18} + \frac{1}{9} = \frac{3}{18} = \frac{1}{6}$

No. of days required by both to complete the work = 6 days



3. Let's construct a right angle triangle with base 1 unit, height 3 units

$$\begin{aligned} \text{Then hypotenuse} &= \sqrt{\text{base}^2 + \text{height}^2} \\ &= \sqrt{1^2 + 3^2} \\ &= \sqrt{1+9} \\ &= \sqrt{10} \end{aligned}$$



Thus by making a line segment AB of 1 unit and another orthogonal to it with a common point 3 unit AC .

If we join BC . Then BC has to be of length $\sqrt{10}$ unit. Now measure BC with a compass and mark on number line

4. $2\pi r - 2r = 45$

$$\Rightarrow 2r(\pi - 1) = 45$$

$$\Rightarrow 2 \times r \times \left(\frac{22}{7} - 1\right) = 45$$

$$\Rightarrow 2 \times r \times \frac{15}{7} = 45$$

$$r = \frac{21}{2} = 10.5$$

5.
$$\begin{aligned} \text{Discount \%} &= \frac{1900 - 1805}{1900} \times 100 \\ &= \frac{95}{19} \% = 5\% \end{aligned}$$

Q. 4

1. Let the number be x , y and z we know that

Product of two numbers = product of their G.C.D and L.C.M

$$\Rightarrow xy = 25 \times 150 \quad \dots\dots(i)$$

$$yz = 15 \times 525 \quad \dots\dots(ii)$$

$$zx = 5 \times 1050 \quad \dots\dots(iii)$$

Multiplying the three equations we get

$$x^2 y^2 z^2 = 25 \times 150 \times 15 \times 525 \times 5 \times 1050$$

$$\Rightarrow xyz = 25 \times 25 \times 21 \times 3 \times 10$$

Now,
$$z = \frac{xyz}{xy}$$

$$z = \frac{25 \times 25 \times 21 \times 10 \times 3}{25 \times 150}$$

$$= 21 \times 5 = 105$$

$$y = \frac{25 \times 25 \times 21 \times 10 \times 3}{5 \times 1050}$$

$$= 75$$

$$x = \frac{25 \times 25 \times 21 \times 10 \times 3}{5 \times 525}$$

$$x = 50$$

∴ Three number are 50, 75, 105

2. $n(C) = 58\%$

$$n(F) = 38\%$$

$$n[(C \cup F)^c] = 17\% \Rightarrow n(C \cup F)$$

$$= 100 - 17$$

$$= 83\%$$

$$n(C \cap F)?$$

$$n(C) + n(F) - n(C \cup F) = n(C \cap F)$$

$$\Rightarrow 58 + 38 - 83 = n(C \cap F)$$

$$\Rightarrow 13\% = n(C \cap F)$$

$$13\% \text{ of } x = 104$$

$$x = \frac{104 \times 100}{13} = 800$$

3. $2(l+b) = 230 \Rightarrow l+b = 115$ (1)

$$l' = l - 10\% \text{ of } l$$

$$= \frac{9l}{10}$$

$$b' = \frac{11b}{10}$$

$$\text{New perimeter} = 2(l' + b')$$

$$= 2\left(\frac{9l}{10} + \frac{11b}{10}\right)$$

$$= \frac{9l + 11b}{5}$$

$$\frac{9l + 11b}{5} = 224$$

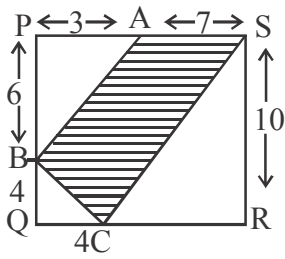
$$9l + 11b = 1120$$
(2)

solving (1) and (2), we have

$$l = \frac{145}{2}$$

$$b = \frac{85}{2}$$

4.



$$\begin{aligned} \text{Area of shaded region} &= \text{area of sq. PQRS} - (ar(\Delta PBA) + ar(\Delta BQC) + ar(\Delta SCR)) \\ &= 10^2 - \left(\frac{1}{2} \times 6 \times 3 + \frac{1}{2} \times 4 \times 4 + \frac{1}{2} \times 10 \times 6 \right) \\ &= 100 - (9 + 8 + 30) \\ &= 53 \text{ sq. unit} \end{aligned}$$

5. Let time taken in walking and running be t_1 and t_2 respectively

$$t_1 + t_2 = 3$$

$$\text{also, } t_1 = \frac{d}{3}, \quad t_2 = \frac{15-d}{9}$$

$$3 = t_1 + t_2$$

$$\Rightarrow 3 = \frac{d}{3} + \frac{15-d}{9}$$

$$\Rightarrow d = 6$$

$$\begin{aligned} \text{Distance covered by running} &= 15 - d \\ &= 15 - 6 = 9 \end{aligned}$$

Q. 5

1. $\frac{9^n \times 3^5 \times 27^3}{3 \times 81^4} = 27, n = ?$

$$\Rightarrow \frac{3^{2n} \times 3^5 \times 3^9}{3 \times (3^4)^4} = 3^3$$

$$\Rightarrow 3^{2n+14-17} = 3^3$$

$$\Rightarrow 3^{2n-3} = 3^3$$

$$\Rightarrow 2n - 3 = 3$$

$$n = 3$$

2. Number of worker after 2 years

$$= 6400 \left(\frac{25}{100} \right)^2$$

$$= 6400 \times \frac{9}{16}$$

$$= 3600$$

3.

$$\begin{array}{r|l}
 2 & 281216 \\
 \hline
 2 & 140608 \\
 \hline
 2 & 70304 \\
 \hline
 2 & 35152 \\
 \hline
 2 & 17576 \\
 \hline
 2 & 8788 \\
 \hline
 2 & 4394 \\
 \hline
 13 & 2197 \\
 \hline
 13 & 169 \\
 \hline
 13 & 13 \\
 \hline
 & 1
 \end{array}$$

$$281216 = \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{13} \times \underline{13} \times \underline{13}$$

∴ The number should be divided by 2 to become a perfect cube.

4.

$$\begin{aligned}
 \frac{x^6 - y^6}{x^4 - y^4} &= \frac{(x^2)^3 - (y^2)^3}{(x^2)^2 - (y^2)^2} \\
 &= \frac{(x^2 - y^2)(x^4 + y^4 + x^2y^2)}{(x^2 - y^2)(x^2 + y^2)} \\
 &= \frac{x^4 + y^4 + x^2y^2}{x^2 + y^2}
 \end{aligned}$$

5.

Let the integer be x

$$x + \frac{x-1}{3} \leq \frac{x+1}{2}$$

$$\Rightarrow \frac{12+x-1}{3} \leq \frac{x+1}{2}$$

$$\Rightarrow 2x + 22 \leq 3x + 3$$

$$\Rightarrow 3x - 2x \leq 2z - 3$$

$$\Rightarrow x \geq 19$$

Least value of such integer is 19