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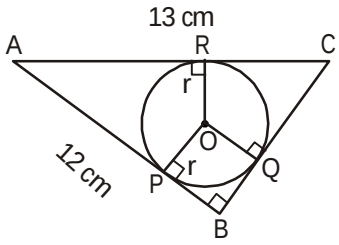
NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

Solutions for sample questions

Class : 10

Mathematics

1. **(D)**



Using Pythagoras' theorem,

$AC^2 = AB^2 + BC^2$

$\Rightarrow BC^2 = (13)^2 - (12)^2 = 25$

$\Rightarrow$ BC = 5 cm

OP = OQ = OR = r (radius)

POQB is a square

$\Rightarrow$ PO = BQ = r

AP = 12 – r, QC = 5 – r,

AR = AP = 12 – r, RC = QC = 5 – r

$\therefore$ AR + RC = AC

$\Rightarrow$ 12 – r + 5 – r = 13

$\Rightarrow$ 17 – 2r = 13

$\Rightarrow$ 2r = 4

$\Rightarrow$ r = 2 cm

2. **(D)** $\sin\theta = -\frac{1}{2}$

sin θ is negative in 3rd and 4th quadrants. Hence the angles are 210° and 330°.

3. **(D)** Let the quotient when the given number is divided by 143 be 'q'. Given that the remainder is 31, the number

= 143q + 31

= 11 × 13q + 11 × 2 + 9

= 11(13q + 2) + 9

Hence the remainder when the same number is divided by 11 is 9.

4. **(D)** $539 = 7^2 \times 11$ is common in the given numbers.

Hence 539 is the common factor of the given numbers.

5. **(C)** Given $x^2 + 5px + 16 = 0$ has no real root

$\Rightarrow b^2 - 4ac < 0$

$\Rightarrow (5p)^2 - 4(1)(16) < 0$

$\Rightarrow 25p^2 - 64 < 0$

$\Rightarrow p^2 < \frac{64}{25}$

$\Rightarrow p < \frac{8}{5}$

$\Rightarrow$ p lies between $\frac{-8}{5}$ and $\frac{8}{5}$.

Physics

6. **(C)** $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ (in parallel), $\frac{1}{R} = \frac{1}{6} + \frac{1}{4}$

$= \frac{4+6}{24} = \frac{10}{24}$, Total $R = \frac{24}{10} = 2.4\Omega$

Total I = 1.2 A, V = IR = $1.2 \times 2.4 = 2.88$ V

V = IR_1 , I = $\frac{2.88}{6} = 0.48$A

7. **(C)** The magnetic needle will be perpendicular to the current carrying conductor, i.e., it points in north - south. direction.

8. **(C)** The field pattern in option (C) is valid for both electric and magnetic fields.

9. **(B)** Resistance is the ratio of potential difference in volts across the component to the current passing through measured in amperes.

10. **(A)** The potential difference of the bulb is 1.5 V (as the e.m.f. of a dry cell is 1.5 V) since a closed switch is a conductor and has zero voltage.

Chemistry

11. **(C)** Decomposition of calcium carbonate is balanced.

12. **(D)** Gallium, germanium and arsenic all belong to the same period (4^{th}).

13. **(C)** The structure in option (C) represents an halogen fluorine of group 17 of the periodic table. It has seven valence electrons.

14. **(B)** 'X' is zinc and 'Y' is copper. Zinc is more reactive than copper. Zinc displaces copper from copper sulphate compound so that copper is set free. It is a displacement reaction.

15. **(A)** Reaction of water with calcium oxide is a compound - compound combination reaction.

$$\underset{\text{compound}}{H_2O} + \underset{\text{compound}}{CaO} \longrightarrow \underset{\text{compound}}{Ca(OH)_2}$$

Biology

16. **(C)** Ultra filtration of liquid take place in glomerulus.

17. **(B)** Female destined zygote cell contains 44+XX chromosomes.

18. **(B)** The given figure is that of pancreas. It controls blood sugar level.

19. **(A)** Blood group AB is called the universal recipient.

20. **(C)** Windmills generate power by using wind energy without causing pollution.