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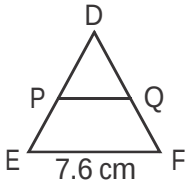
NATIONAL LEVEL SCIENCE TALENT SEARCH EXAMINATION

Solutions for sample questions

Class : 9

Mathematics

1. **(A)**



Length of PQ = $\frac{1}{2}$EF

$= \frac{1}{2} \times 7.6$ cm

= 3.8 cm

2. **(B)** Δ ABC & Δ ADC are Isosceles

$\Rightarrow \angle ABC = \angle ACD$

& $\angle DBC = \angle DCB$

$\Rightarrow \angle ABC : \angle ACD = 2\angle ACD : \angle ACD$

Hence, $\angle ABC : \angle ACD = 2 : 1$

3. **(D)** Since PQ = 4 cm = $2 \times$ OQ

= 2 $\times$ radius, PQ is the diameter of circle.
Join RQ. $\angle PRQ = 90°$.

(Angle in a semicircle.)

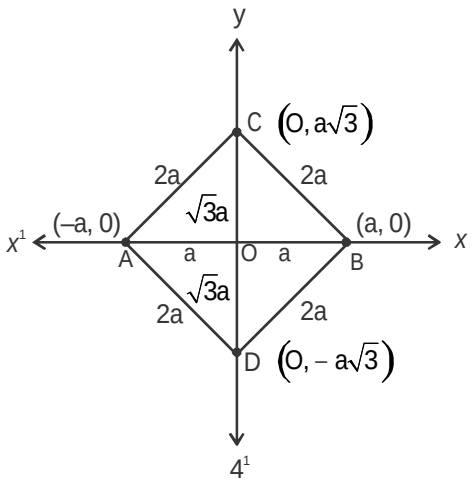
$\therefore \angle ORQ = 90° - 35° = 55°$

But OR = OQ.

$\therefore \angle ORQ = \angle OQR = 55°$

$\therefore y = 180° - (55° + 55°) = 70°$

4. **(C)**



Δ ABC and Δ ABC are equilateral.

$\Rightarrow$ AB = AC = CB and AB = BD = AD

AB = a + a = 2a

$\Rightarrow$ AC = BC = AB = BD = AD = 2a

$\Rightarrow OA^2 + OC^2 = AC^2$

$\Rightarrow a^2 + OC^2 = 4a^2$

$\therefore$ OC = $a\sqrt{3}$

$\therefore$ The co-ordinates of C(0, $a\sqrt{3}$) and D(0, $-a\sqrt{3}$)

5. **(B)** $\frac{3}{4}x = 72$

$x = \frac{72 \times 4}{3} = 96$

$x = \frac{96}{2} = 48$ cm^2

Physics

6. **(C)** Inertia is the reluctance for objects to start moving and stop moving. An object with high inertia will need more effort to move than an object with lower inertia

7. **(B)** First case $F = m \times a = \frac{10}{1000}\ kg \times 5\ ms^{-2}$

$= 0.05\ N$

Second case $F = m \times a = \frac{20}{1000}\ kg \times 2\ ms^{-2}$

$= 0.04\ N$

As $F_1 > F_2$, more force is required in the first case.

8. **(B)** Both the balls have the same mass as the metre rule is balanced when they are placed at the same distance from the pivot.

9. **(C)** $F = ma,\ m = \frac{F}{a} = \frac{10}{2} = 5\ kg$

10. **(C)** Kinetic energy $= \frac{1}{2}mv^2 = \frac{1}{2}(2)(3)^2 = 9\ J$

Chemistry

11. **(B)** The beaker that is left in a sunny and windy environment will have higher temperature and fresh air moving over the surface of the water all the time. This beaker will have the least amount of water.

12. **(B)** $12 \times 98.9\% + 13 \times 1.1\% = 12.011$ amu

13. **(C)** For all the three given substances to be in the same state there are three possibilities.

- All of them are in the solid state, which means their temperature must be lower than the lowest melting point (10° C).
- All of them are in the liquid state, which means their temperature must be between the highest melting point (65° C) and the lowest boiling point (78° C).
- All of them are in the gaseous state, which means their temperature must be higher than the highest boiling point (120° C).

From the options provided, the only possible answer is 75° C. At 75° C, all the three substances are in the liquid state.

14. **(D)** Carbon dioxide and nitrous oxide have the same formula unit mass.

Option (A) $CaCl_2 = 40 + 71 = 111$

$K_2CO_3 = (39 \times 2) + 12 + (16 \times 3)$

$= 78 + 12 + 48 = 138$

Option(B) $CaO = 40 + 16 = 56$

$HCl = 1 + 35.5 = 36.5$

Option (C) $CO = 12 + 16 = 28$

$NH_3 = 14 + 3 = 17$

Option (D) $CO_2 = 12 + 16 \times 2 = 44$

$N_2O\ (14 \times 2) + 16 = 44$

15. **(D)** The correct properties are hot/dry for fire, dry/cold for air, wet, cold for earth and wet/hot for water.

Biology

16. **(A)** Diploblastic animals have a body cavity made of two cellular layers – an ectoderm and an endoderm.

The cnidarians are diploblastic, whereas all other metazoans are triploblastic. In small, simple cnidarians, such as Hydra, the diploblastic condition is clearly visible.

17. **(D)** The given process is an essential process in maintaining the balance between oxygen and carbon dioxide in the atmosphere.

18. **(A)** P represents nerve cells. It is found in the nervous system.

19. **(D)** Uterus, skin and nose are the organs.

Cells → tissues → organs → system.

20. **(B)** The process 'T' represents condensation. When water vapour loses heat, it condenses to form water droplets.