

# The Brigade School@ G and W

Total points 10.5/15 ?

Class 10

Physics

Marks 15

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10 A



- ✓ 1. Two forces of 10 N each act at the end of a 4 m rule AB placed at its centre. If the force acts northwards at A and southwards at B find the moment of force and the direction of rotation. \* 2/2

Moment of force at A =  $F \times OA = 10 \times 2 = 20 \text{ Nm}$ (clockwise)

Moment of force at B =  $F \times OB = 10 \times 2 = 20 \text{ Nm}$ (clockwise)

Total moment of force =  $20 + 20 = 40 \text{ Nm}$  (clockwise).

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#### Feedback

*moment of Rotation:  $10 (2+2) = 40 \text{ Nm}$  [1]*

*Direction of rotation = clockwise [1]*

- ✓ 2. A body is travelling in circular motion with a constant speed of 5 m/s. Is this motion Accelerated. Justify your answer. \* 3/3

A body travelling in circular motion with a constant speed of 5 m/s is accelerated motion there is a continuous change in the direction of motion along the tangent drawn at the point of the circular path. This implies that velocity of particle is non-uniform, i.e motion in accelerated.

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#### Feedback

*Body is travelling with uniform speed in circular motion.*

*In circular motion the direction of the body changes every instant i.e, the velocity changes.*

*Change in velocity means acceleration.*

*hence body in uniform circular motion has accelerated motion even though speed is constant*



✗ 3. Give reason why a boat may topple if passengers suddenly stand up. \* 1/2

A boat may topple if passengers suddenly stand up because the centre of gravity of the boat will change. The centre of the gravity of a body is the point about which the algebraic sum of moment of weight of all particles constituting the body is zero.

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**Feedback**

*For a stable equilibrium of a body its centre of gravity must be as low as possible. If the passengers suddenly stand up the CG changes and moves up and so the boat may topple*

✗ 4. Where does the centre of gravity lie in the following: (a) Hollow cone 2/3  
from its base (b) solid cone from its vertex (c) Solid cylinder \*

- (a) At a height  $h/3$ .  
(b) At a height  $h/4$ .  
(c) Mid-point on the axis of the cylinder.
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**Feedback**

- (a)  $h/3$   
(b)  $3h/4$   
(c) mid point on axis of cylinder



- ✗ 5. A metre rule of 100g is balanced at the 40 cm mark by suspending a 2.5/5 body of mass  $m$  at the 20 cm mark. (i) find the mass of the body. (ii) what will happen if the body is moved to the 10 cm mark? (iii) what will be the resultant moment at this position? (iv) How can it be balance by another mass of 50 g? \*

(i) Acc. to principle of moments of equilibrium, sum of anticlockwise moments = sum of clockwise of moments,  $m \times 20 = 100 \times 10$

$$m = 1000/20 = 50 \text{ g}$$

(ii) The rule will tilt to the side where mass  $m$  is suspended.

(iii) 500 g cm

(iv) To balance it 50g weight should be kept on right hand .

### Feedback

(i)  $m \times 20 = 100 \times 10 = 50 \text{ gf}$  [1]

(ii) Will bend towards the side of mass  $m$  [1]

(iii) Anti clockwise moment =  $30 \times 50 = 1500$

Clockwise moment =  $100 \times 10 = 1000$

Resultant =  $1500 - 1000 = 500 \text{ g cm anticlockwise}$  [1/2 + 1/2]

(iv) At equilibrium ACM = CM [1/2]

$30 \times 50 = 50 \times d + 100 \times 10$  [1/2]

$d = 500/50 = 10 \text{ cm}$  [1/2]

so 50 g should be suspended at 50 cm mark [1/2]

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