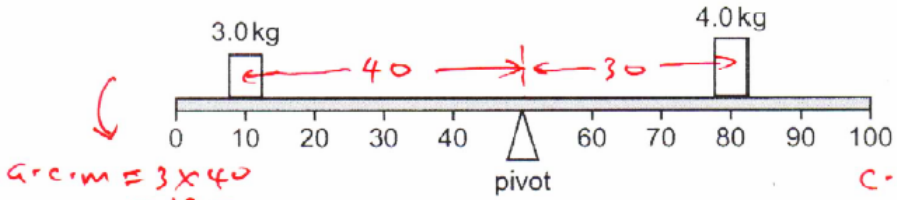
Turning Effect of Force – 2021 IGCSE 0625

1. Nov/2021/QPaper_11/No.5

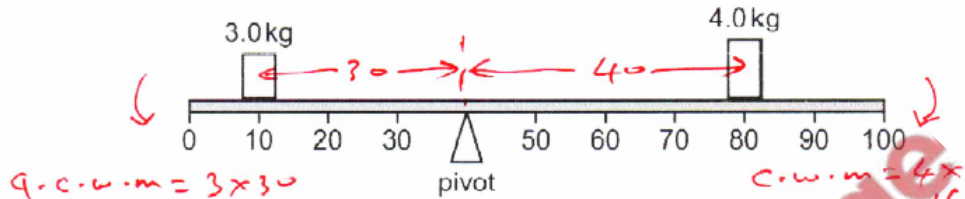
A 100 cm beam balances as shown.



anticlockwise moment = 3 × 40 = 120

clockwise moment = 4 × 30 = 120

The pivot is moved 10 cm to the left.



anticlockwise moment = 3 × 30 = 90

clockwise moment = 4 × 40 = 160

What will be the effect of this change on the anticlockwise and clockwise moments about the pivot?

	anticlockwise moment	clockwise moment
A ✓	decreases	decreases
(B)	decreases	increases
C	increases	decreases
D	increases	increases

- anticlockwise moment decreased from 120 to 90
- clockwise moment increased from 120 to 160.

2. Nov/2021/QPaper_11,12&13/No.6

A spacecraft is travelling in space with no resultant force and no resultant moment acting on it.

Which statement about the spacecraft is correct?

A Its direction is changing. ✓

(B) It is in equilibrium.

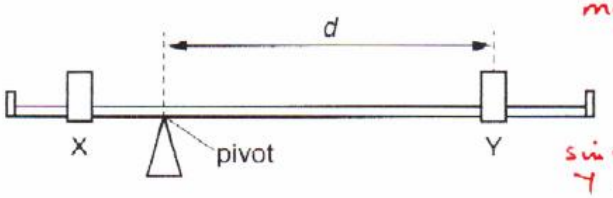
C Its speed is decreasing.

D Its speed is increasing.

A body is in equilibrium if no resultant force or moment act on it.

3. Nov/2021/QPaper_12/No.5

The diagram shows a simple balance. The two loads, X and Y, can be moved along the beam.

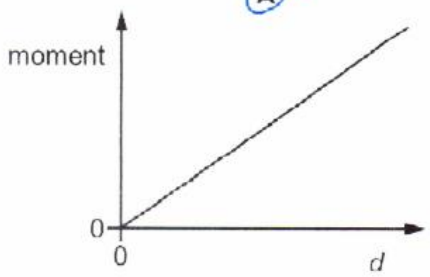


moment = force × distance
$y = mx + c$.
force = gradient
since force (weight) of load Y remains same, so

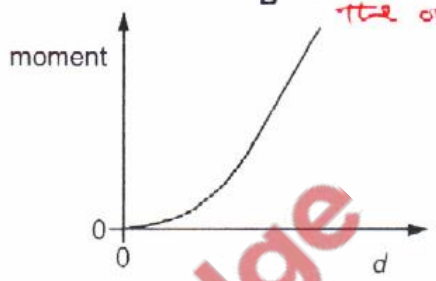
Which graph shows how the moment produced by load Y varies as the perpendicular distance d from the pivot changes?

gradient is same.
- so straight line through the origin.

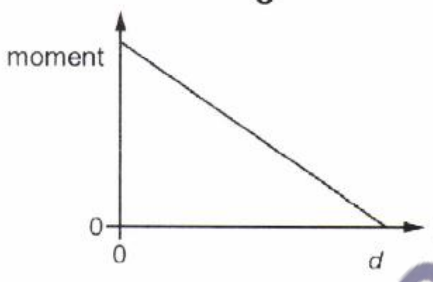
A ✓



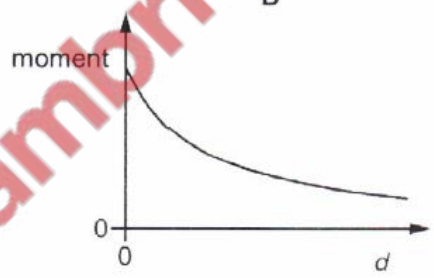
B



C

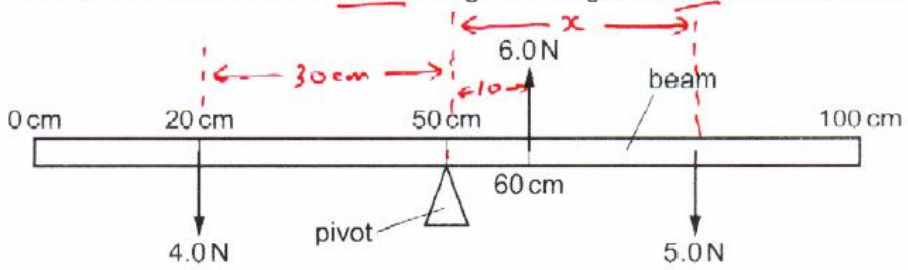


D



4. Nov/2021/QPaper_13/No.5

The diagram shows a uniform beam 100 cm long. The diagram is not drawn to scale.



The beam remains balanced on a pivot at the 50 cm mark under the action of the forces of 4.0 N, 5.0 N and 6.0 N.

The 4.0 N force is at the 20 cm mark and the 6.0 N force is at the 60 cm mark.

At which point on the beam is the 5.0 N force acting?

A at the 62 cm mark

B at the 74 cm mark

C at the 86 cm mark

D at the 88 cm mark

c.w.m = a.c.w.m.

$5x = (4 \times 30) + (6 \times 10)$

$5x = 120 + 60$

$5x = 180$

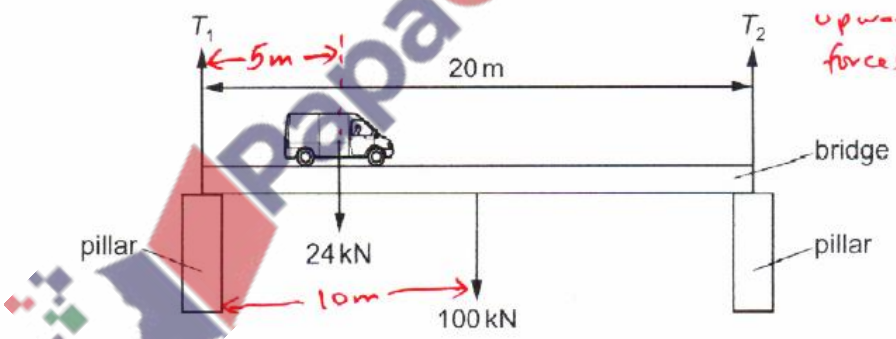
$x = \frac{180}{5}$

$= 36$ cm

$\therefore 50 + 36 = 86$ cm mark.

5. Nov/2021/QPaper_21/No.5

A 20 m long, uniform bridge of weight 100 kN is supported at each end by pillars, as shown.



upward forces = downward forces.

The pillars exert forces T_1 and T_2 on the ends of the bridge.

What are the values of T_1 and T_2 when a van of weight 24 kN is on the bridge, 5 m from the left-hand pillar?

	T_1/kN	T_2/kN
A	56	68
B	62	62
C	68	56
D	74	50

$T_1 + T_2 = 100 + 24$

$= 124$ kN

Let T_1 be the pivot:

$T_2 \times 20 = (24 \times 5) + (100 \times 10)$

$T_2 \times 20 = 120 + 1000$

$T_2 = \frac{1120}{20} = 56$ kN

$T_1 + T_2 = 124$

$T_1 = 124 - T_2$

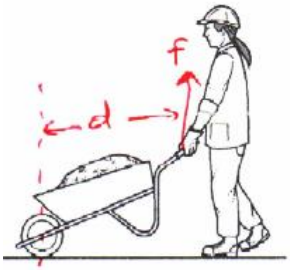
$= 124 - 56$

$= 68$ kN

6. Nov/2021/QPaper_22/No.5

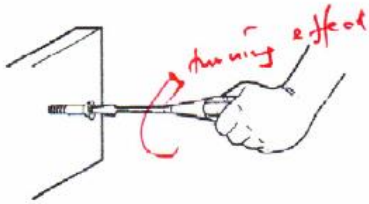
Three simple machines are shown.

1 ✓ 2 ✓ 3 ✓



moving soil with a wheelbarrow

cutting string with scissors



screwing a screw with a screwdriver

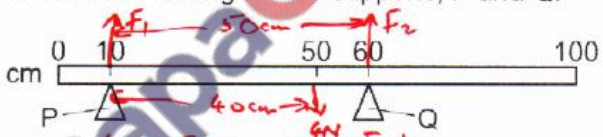
Which machines are an application of the moment of a force?

moment = force × distance

(A) 1, 2 and 3 ✓ B 1 and 2 only C 1 and 3 only D 2 and 3 only

7. Nov/2021/QPaper_23/No.5

The diagram shows a uniform bar resting on two supports, P and Q.



Let F_1 be the pivot.

$F_2 \times 50 = 4N \times 40cm$

$F_2 = \frac{160}{50} = 3.2N$

$F_1 + F_2 = 4N$

$F_1 = 4 - F_2$

$= 4 - 3.2$

$F = 0.8N$

The weight of the bar is 4.0 N.

What is the force exerted on the bar by support P?

(A) 0.80 N ✓ B 2.0 N C 3.2 N D 4.0 N

8. Nov/2021/QPaper_31/No.3

(a) A student determines the centre of mass of a piece of card. Fig. 3.1 shows the equipment the student uses.

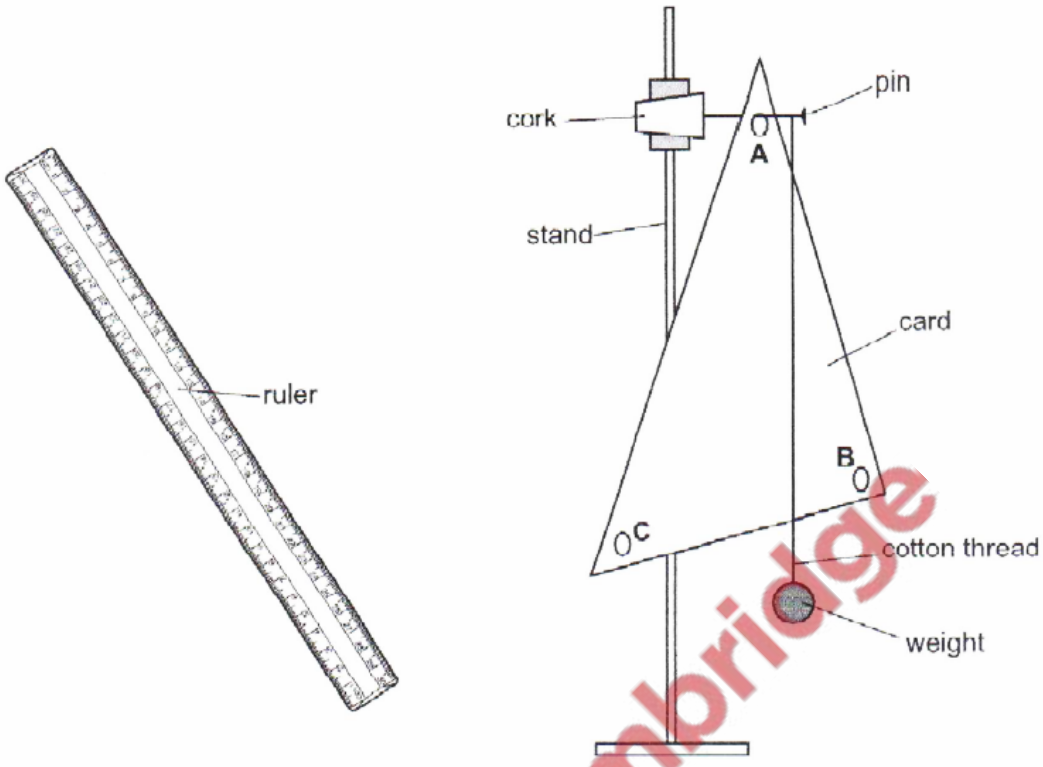


Fig. 3.1

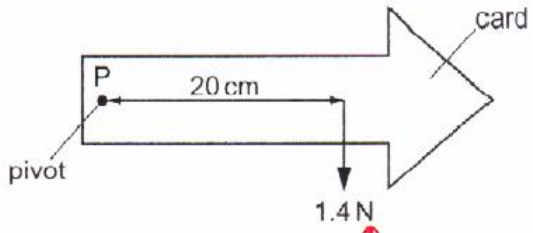
Describe how the student determines the centre of mass of the card using the equipment in Fig. 3.1.

– Draw a line alongside the cotton thread.
– Hang the triangle at point C and draw another line alongside the cotton thread.
– The point where the two lines meet is the centre of mass of the card.

[3]

(b) Another card is pivoted at point P. The weight of the card is 1.4 N and acts through a point 20 cm from P.

Fig. 3.2 shows the arrangement.



Force = Weight

Fig. 3.2

Calculate the moment of the weight of the card about point P.

moment = Force × distance

= 1·4N × 20 cm

= 28 N cm

moment of weight = ... 28 ..... N cm [3]

[Total: 6]

9. Nov/2021/QPaper_32/No.5

(a) A student determines the centre of mass of a piece of wood. The wood is an irregular shape of constant thickness.

He suspends the piece of wood from a nail as shown in Fig. 5.1. The wood is able to swing freely.
The student suspends a weight on a thin string from the nail.

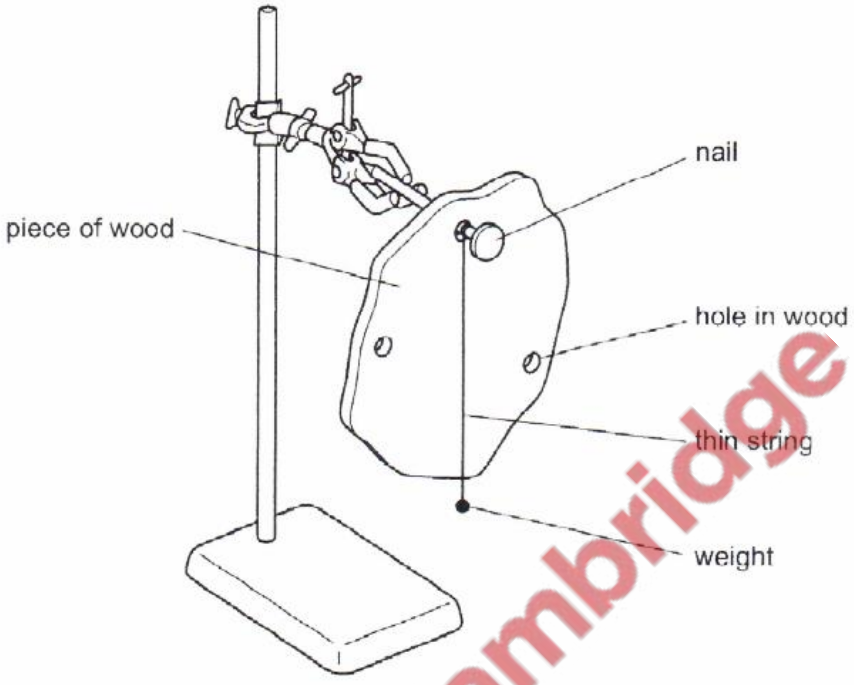


Fig. 5.1

Describe how to determine the centre of mass of the piece of wood in Fig. 5.1.
You may draw a diagram to help your answer.

- Draw a line alongside the thin string when suspended on the nail.
- Suspended the piece of wood on another hole and draw another line. C.O.M is at the point where the two lines cross. [3]

(b) Fig. 5.2 shows a flat, symmetrical object. Indicate its centre of mass by drawing X in the correct position.

↑ will be in the middle, since the object is symmetrical and flat.

Fig. 5.2

[1]

(c) Fig. 5.3 shows a side view of a drinking-glass in two different positions, A and B.

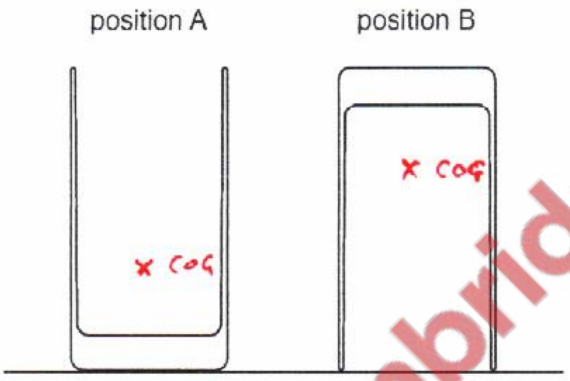


Fig. 5.3

State which position, A or B, is more stable. Explain your answer.

- Position A is more stable.
- The COG is lower and it stands a heavier base.

[2]

[Total: 6]