CAMBRIDGE LOWER SECONDARY CHECKPOINT

PRACTICE QUESTIONS & MARK SCHEMES

Stage 8 / Subject: Physics

Topic: Forces : Moment of a force Set-1

1 Fig. 3.1 shows a girl and a boy on a see-saw.

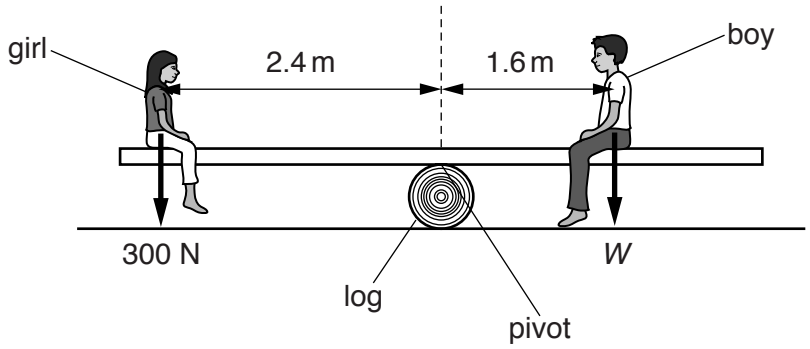

Fig. 3.1

The see-saw pivots on the log.

(a) Calculate the girl's moment about the pivot.

girl's moment = ... N m [2]

(b) The see-saw is balanced horizontally.

Calculate the weight *W* of the boy.

weight of boy = ... N [3]

[Total: 5]

MARKING SCHEME:

(a)	force × distance (from pivot) OR 300 × 2.4 720 (N m)	**C1** **A1**
(b)	sum of clockwise moment = sum of anticlockwise moment 720 = W × 1.6 OR 720 ÷ 1.6 450 (N)	**C1** **C1** **A1**
		Total: 5

2 **(a)** State the two factors on which the turning effect of a force depends.

1. .....

2. ..... [2]

(b) Forces F_1 and F_2 are applied vertically downwards at the ends of a beam resting on a pivot P. The beam has weight W. The beam is shown in Fig. 5.1.

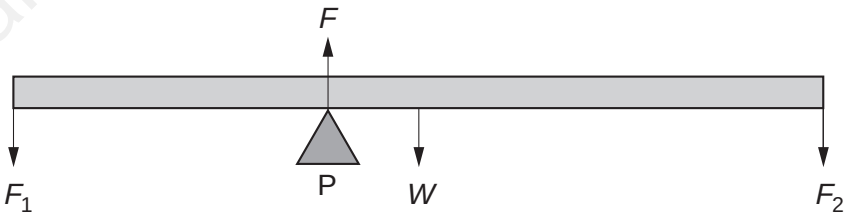

Fig. 5.1

(i) Complete the statements about the two requirements for the beam to be in equilibrium.

1. There must be no resultant .....

2. There must be no resultant .....

(ii) The beam in Fig. 5.1 is in equilibrium. F is the force exerted on the beam by the pivot P.

Complete the following equation about the forces on the beam.

$F =$ .....

(iii) Which one of the four forces on the beam does **not** exert a moment about P?

.....

[4]

MARKING SCHEME:

(a)	(magnitude of) force		B1
	distance (from fulcrum)		B1
(b)	**(i)**	force	B1
		moment OR turning effect	B1
	(ii)	$F_1 + F_2 + W$	B1
	(iii)	F	B1
			6

3 **(a)** State what is meant by the *moment* of a force.

.....

..... [1]

(b) A warehouse worker is about to close a large door, as shown in Fig. 3.1.

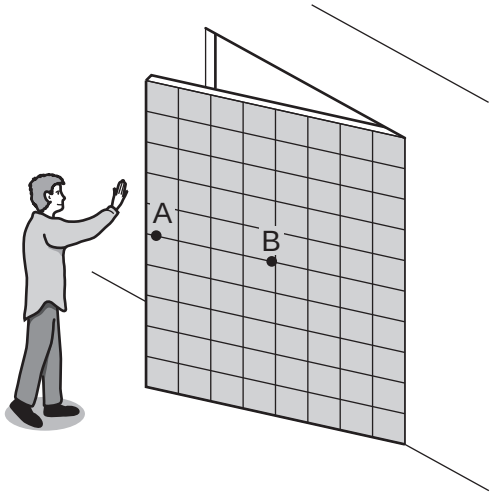

Fig. 3.1

(i) State, with a reason, which of the two positions, A or B, will enable him to close the door with least force.

.....

.....

..... [1]

(ii) On another occasion, with the door in the position shown in Fig. 3.1, two workers each push on the door with the same force at the same time. One worker pushes at A, from the side seen in Fig. 3.1. The other worker pushes at B, from the other side of the door.

Which way does the door move, if at all? Tick one box.

the door closes	☐
the door opens	☐
the door remains as it is	☐

[1]

[Total: 3]

MARKING SCHEME:

(a)	turning effect OR force x distance (from fulcrum)	B1	
(b) **(i)**	A and idea of bigger distance from hinge/pivot	B1	
(ii)	closes	B1	[3]

4 **(a)** State what is meant by the *moment* of a force.

.....

.....[1]

(b) A plank balances horizontally on a log of wood, which acts as a pivot.

A girl sits on one end of the plank, and a boy pushes down on the other end to keep the plank horizontal. Fig. 3.1 shows this arrangement.

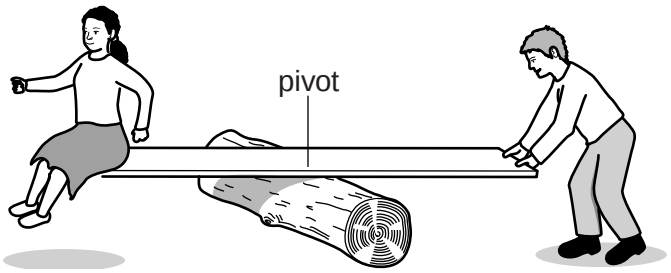

Fig. 3.1

(i) What two things can be said about the moments caused by the boy and by the girl?

1. .....

2. .....
[2]

(ii) There are four forces acting on the plank when it is in equilibrium. Three of the forces are:

- the weight of the girl
- the weight of the plank
- the force provided by the boy

1. Where does the fourth force act?

.....

2. What is the direction of this force?

.....
[2]

[Total: 5]

MARKING SCHEME:

(a)	turning effect OR force x distance (between force and pivot)		B1
(b)	**(i)**	equal (magnitude) accept the same size/balanced note: no turning effect is insufficient	B1
		opposite direction note: CW moment = ACW moment scores both marks	B1
	(ii)	**1**. at pivot (however expressed) e.g. idea of where plank in contact with log	B1
		2. upwards accept up, vertically is insufficient	B1

[Total: 5]

5 Fig. 2.1 shows a hinged rail in a fence. The rail has to be lifted vertically in order to let people through.

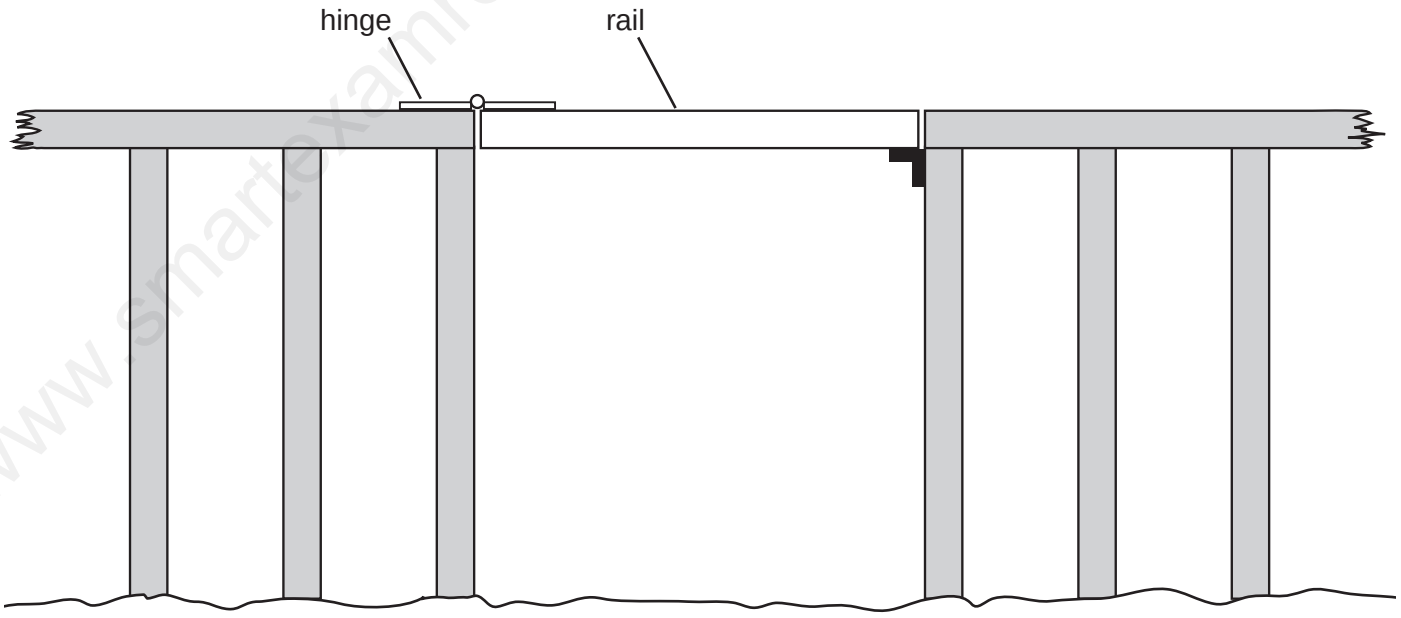

Fig. 2.1

(a) On Fig. 2.1, draw an arrow to show the position and direction of the smallest force that would be needed to begin to raise the rail. [3]

(b) What is the correct Physics term for the turning effect of a force?

Tick one box.

force	☐
work	☐
moment	☐
movement	☐

[1]

(c) Suggest one way the designer of the fence could have reduced the force needed to lift the rail.

.....

.....[1]

MARKING SCHEME:

(a)	straight vertical arrow upwards to/from rail	F	B1
	arrow to R of centre of rail	F	C1
	arrow at R.H. end of rail (within 2× width of resting block)	F	A1
(b)	moment ticked	F	B1
(c)	reduce weight/mass OR shorten rail, lighter rail, thinner rail, open sideways, suitable long handle, suitable 2 pulley system	F	B1 5

6 A wheel on a car needs changing. Fig. 8.2 shows a spanner being used to turn a wheel nut.

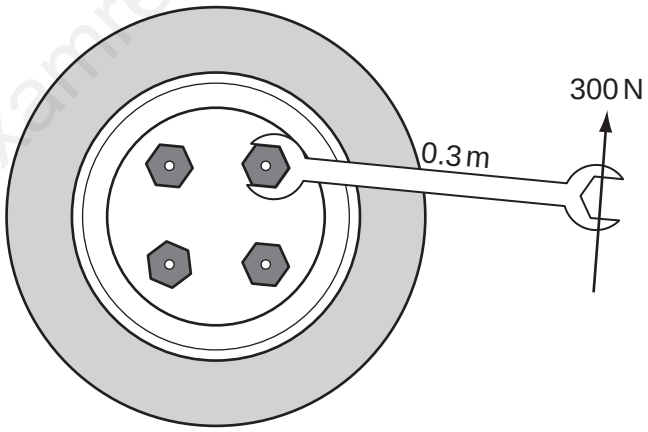

Fig. 8.2

(i) Calculate the turning effect (moment) of the spanner.

State the formula that you use and show your working.

formula

working

..... [2]

(ii) Give **two** ways in which you could increase the spanner's turning effect.

1 .....

.....

2 .....

..... [2]

MARKING SCHEME:

(i) (turning effect =) force × distance ;
= 0.3 × 300 = 90Nm ; [2]
(ii) increase force ;
increase distance / use a longer spanner ; [2]