AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



EXAM QUESTION PACK

4.5.4 MOMENTS, LEVERS AND GEARS (PACK 2)

SCORE	PERCENTAGE
/28	%

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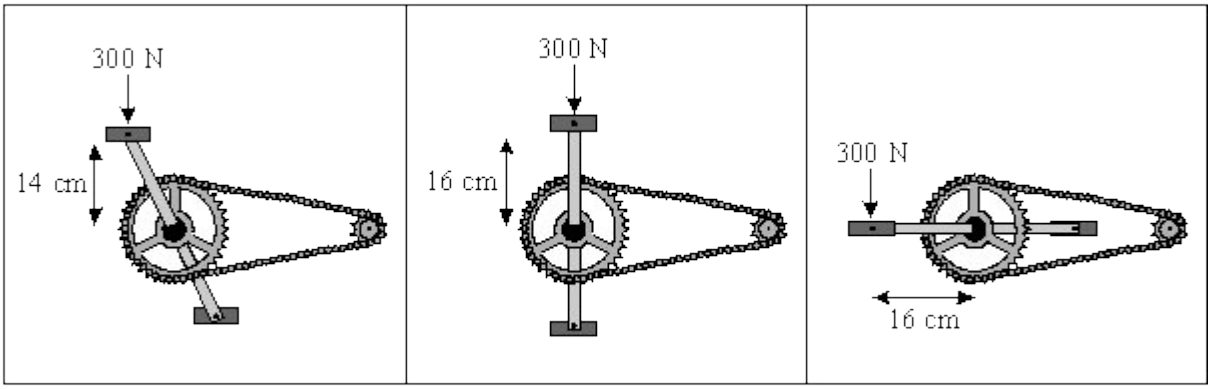
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Q1.

For part of the ride the cyclist pushed on the pedals with a constant vertical force of 300 N. The simplified diagrams show the pedals in three different positions.



A B C

(i) Which position, **A**, **B**, or **C**, gives the largest moment on the pedal?

_____

(1)

(ii) Calculate the size of the largest moment on the pedal, in Newton metres.

_____

_____

Moment = _____ Nm

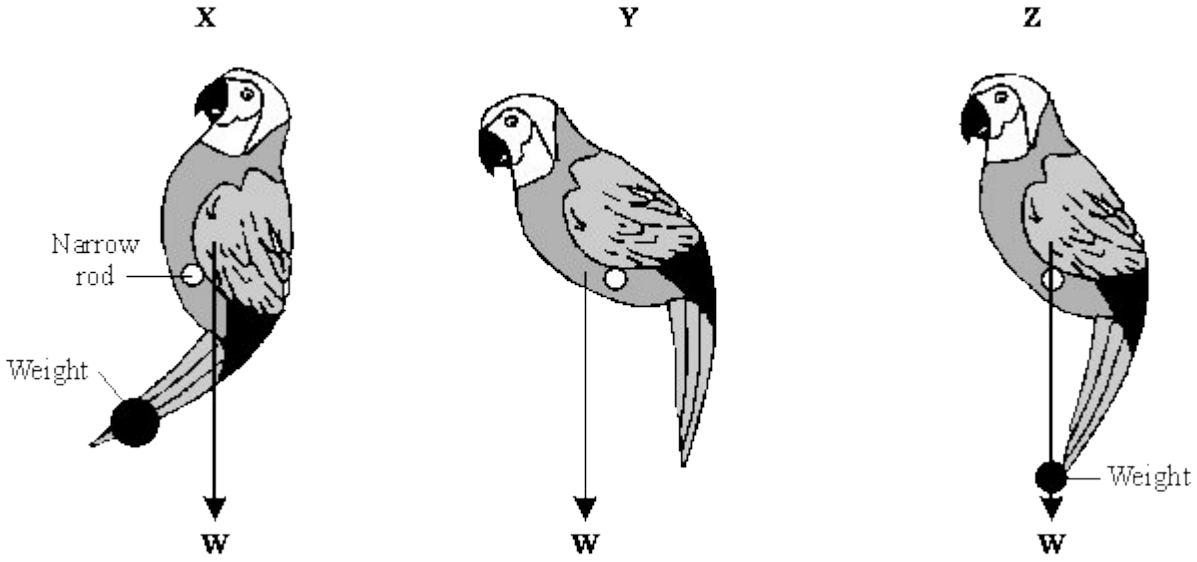
(2)

(Total 3 marks)

Q2.

(a) The diagram shows three similar toys. Each toy should be able to balance on a narrow rod. The arrows show the direction in which the weight of the toy acts.

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Only one of the toys balances on the rod, the other two fall over. Which **one** of the toys is balanced? Explain the reason for your choice.

_____

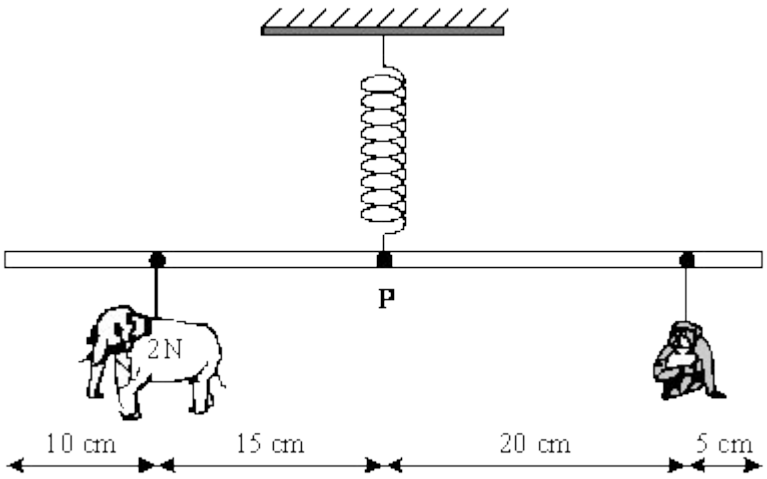
_____

_____

_____

(3)

(b) The diagram shows a simple toy. Different animal shapes can be positioned so that the 50 cm rod balances horizontally.



(i) Calculate the moment exerted by the elephant shape of weight 2N about the pivot **P**. Show clearly how you work out your answer and give the unit.

_____

_____

Moment = _____

(3)

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(ii) Use the following relationship to calculate the weight of the monkey shape.

total clockwise moment = total anticlockwise moment

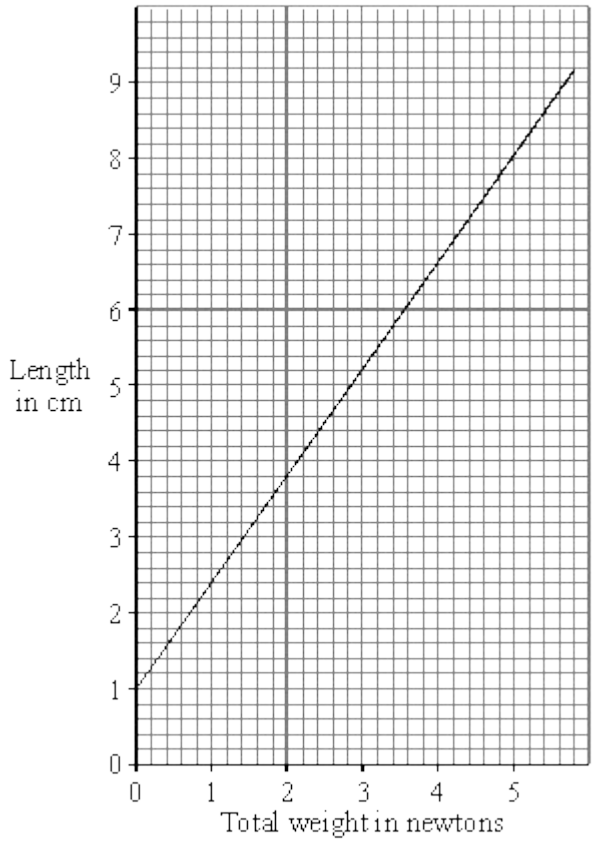
_____

_____

Weight = _____ N

(2)

(c) The graph shows how the length of the spring changes as the total weight of the different animal shapes change.



Use the graph to find how much the spring extends when the elephant shape and the monkey shape are hung from the rod. Show how you get your answer.

_____

_____

Extension of spring = _____ cm

(2)

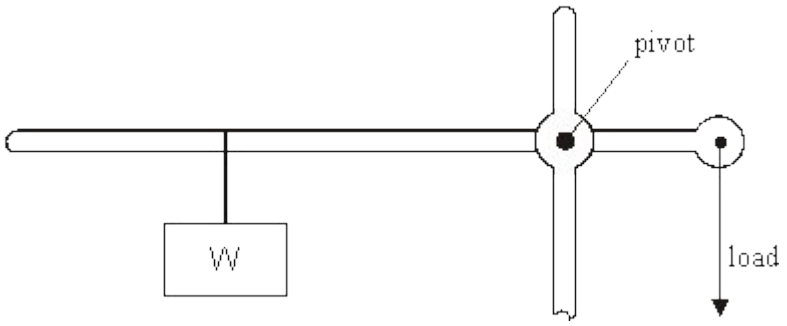
(Total 10 marks)

Q3.

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The diagram below shows an outline of a balance. The balance is used to weigh lorries. A fraction of the weight of a lorry is used as the load on the right side of the pivot.

A standard weight W is moved along the arm until the weight of the load is balanced.



(a) As the weight W is moved away from the pivot it can support a heavier load.
Why is this?

_____

_____

(2)

(b) (i) The weight W is 100 N. When it is 0.2 m from the pivot it balances the load.
Calculate the moment of the weight W about the pivot.

_____

_____

Answer _____ Nm

(2)

(ii) The load is one hundredth of the weight of the lorry and is 0.02 m from the pivot.
Calculate the weight of the lorry.

_____

_____

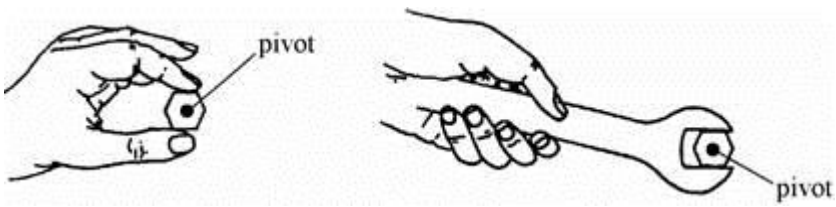
Answer _____ N

(2)

(Total 6 marks)

Q4.

A spanner makes it a lot easier to loosen a bolt.



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You cannot usually loosen a bolt with your fingers.	It is easier with a spanner.

Choose words from this list to complete the sentences below.

lever **piston** **pivot** **pulley** **turning effect**

The spanner is a simple _____

You use it to produce a bigger _____ on the bolt.

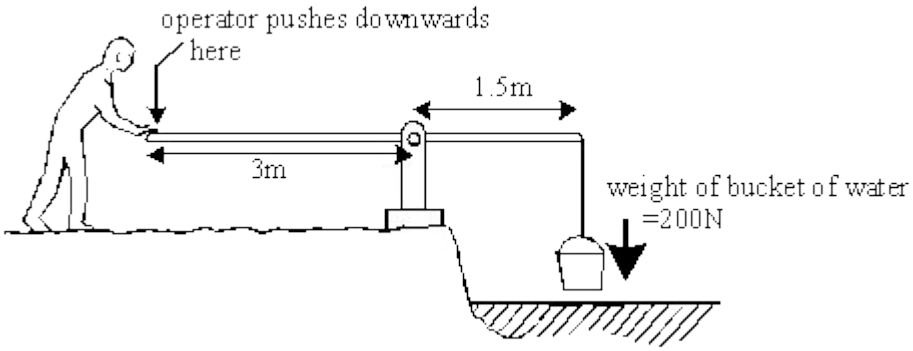
A longer spanner works better.

This is because there is a bigger distance between your force and the _____

(Total 3 marks)

Q5.

The diagram shows a simple machine for lifting water from a river.



(a) Calculate the turning force (moment) of the bucket of water.

(Show your working.)

_____

_____

_____

Answer _____ Nm (newton metre)

(2)

(b) What can you say about the size of downwards force the operator must use to balance the moment of the bucket of water?

(Explain your answer, using numbers if you can.)

_____

_____

_____

_____

(4)

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(Total 6 marks)

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Mark schemes

Q1.

(i) C

1

(ii) 48

*an answer of 4 800 gains **1** mark*

*if answer (b)(i) is given as A then 42 scores **1** mark*
*4200 scores **0** marks substitution of correct* figures = **1** *mark*

2

[3]

Q2.

(a) **Z**

1

weight **or** mass acts through pivot

*accept rod **or** base for pivot*

accept centre of gravity in line with pivot

1

no (resultant) (turning) moment

accept clockwise moment equals anticlockwise moment

*do **not** accept same weight on each side of rod*

1

(b) (i) 30

*allow **1** mark for 2 × 15*

***or** 2 × 0.15*

2

N cm

or