Forces in Action – Past Paper Questions - Markscheme

M1.   (a)   force

1

   (b)   5

allow **1** mark for substitution into correct equation ie $\frac{50}{10}$

2

   (c)   the same as / equal to

accept =

1

   (d)   350 N

2

[6]

M2.   (a)   (i)   arrow from centre of the ball **and** at right angles to the string **and** in the correct direction

arrow should point to the student's belt
accept free-hand 'straight' line
*do **not** accept curved line*

1

   (ii)   increase

accept 'be stronger / bigger'

1

increase

accept 'be stronger / bigger'

1

increase

accept 'be stronger / bigger'

1

   (b)   speed
velocity
direction

*all **three** correct*
*any two correct for **1** mark*
*otherwise **0** marks*

2

   (c)   (i)   centripetal

accept 'centripedal' and other minor misspellings
*do **not** accept anything which could be 'centrifugal'*

1

       (ii)   gravity

> *accept 'weight'*
> *accept 'force of attraction due to mass(es) (of the Moon and the Earth)'*

1

       (iii)   electron(s)

1

       (iv)   electrostatic

> *accept 'electrical' do **not** accept just 'centripetal'*

1

[10]

M3.   (a)   point at which its mass (seems to) act **or** point at which gravity (seems to) act

> *accept ... its weight acts*
> *accept correct statements if the intent is clear e.g.. .. if suspended, the centre of gravity will be directly under the point of suspension*
> *e.g.... (if the object is symmetrical), the centre of gravity is on the **or** an axis (of symmetry)*
> *do **not** credit just 'it is a point'*

1

    (b)   *The answer to this question requires good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme*

> *maximum of **4** marks if ideas not well expressed*

any **five** from:

clamp (steel) rod (horizontally)

> ***no** marks if method quite unworkable*

hang plastic / sheet by rod through (one) hole

hang plumb line from rod

mark ends of plumb line on the sheet and
use the ruler to draw a straight line

repeat with other hole

centre of mass is where the lines cross

check by balancing at this point

> *maximum of **3** marks if no 'repeat with other hole'*

5

    (c)   (i)   (turning) effect **or** moment
               force
               distance

> *all three correct*
> *accept weight*
> *accept length*

| | | 1 |

(ii) 17.6

> *allow 44 x 0.4 or 0.4 x 44 for 1 mark*

| | | 2 |

Nm **or** newton metre(s)

> *do **not** accept N/m or N/cm*
> *1760 Ncm gains all 3 marks*

| | | 1 |

(iii) Clockwise moment about hinge is 17.6Nm (from ii)

So anticlockwise moment must be 17.6Nm

F_{catch} x 0.8m = 17.6Nm

| | | 1 |

F_{catch} = 22N

| | | 1 |

(iv) Total upward force = total downward force

22N + F_{hinge} = 44N

| | | 1 |

F_{hinge} = 22N

| | | 1 |

[15]

M4. (a) 560

> *allow 1 mark for*
> *clockwise (moments) = anticlockwise (moments)*
> *allow 1 mark for correct substitution*
> *ie 160 x 1.75 = W x 0.5*
> *allow 1 mark for correct transformation*
> *ie* $\dfrac{160 \times 1.75 = W}{0.5}$

| | | 4 |

newtons, N

| | | 1 |

(c) the <u>weight</u> of plank which has been ignored

| | | 1 |

causes an anticlockwise moment which has not been
considered / included in the calculation

| | | 1 |

[7]