

M1.(a) A

1

(b) (i) 9000

an answer of 9 k(N) gains 1 mark

1

(ii) increase

accept other comparative terms, eg give a bigger affect / change is insufficient

1

(iii) smaller

accept other comparative terms, eg less

1

(c) Q N M

all three in correct boxes

one statement in correct box gains 1 mark

2

(d) any **two** from:

- increase the current / p.d. (supplied to the coil)
accept reduce the resistance of the coil or increase cross sectional area of wire
accept more cells / batteries or turn up the power supply
increase power is insufficient
- increase number of turns (on the coil)
- increase the area (of the coil)
accept increase the width of the coil
increase width / size is insufficient
- increase the (strength of the permanent) magnetic field

accept move the magnets closer to the coil
accept use stronger magnets
do not accept use larger magnets

2

(e) an economic

1

[9]

M2.(a) increases

1

(b) (i) **B**

1

(ii) tension in the wire

1

(iii) **C**

1

[4]

M3. (a) (i) centripetal force
accept any unambiguous correct indication

1

(ii) **B**

1

(b) (i) decrease
accept any unambiguous correct indication

1

(ii) increase

accept any unambiguous correct indication

1

(c) Bull pit

1

smallest (inside) radius

accept smallest diameter / circumference

1

[6]

M4. (a) increases

1

(b) (i) **B**

1

(ii) tension in the wire

1

(iii) **C**

1

[4]

- M5.** (a) centripetal 1
- (b) **B** 1
- (c) decreases 1

[3]

- M6.** (a) either its direction or its speed 1
- (b) (i) friction 1
- (ii) centripetal 1
- (iii) increase 1
- (iv) increase 1

- (c) examples
- (yes) noisy (1)
- disturbs people living nearby (1)
- (yes) encourages people to drive fast (1) which makes (road) accidents more serious/likely (1)
- (no) leads to improvements in safety features (1) such as better brakes (1)
- (don't know) noisy (1) but new tyres have a better grip (1)
- whichever box has been ticked, the mark(s) is/are for an appropriate response*
- note, accept responses which assume that the public may use the racetrack*

2

[7]

- M7.** (a) (i) direction
accept any unambiguous indication 1
- (ii) centripetal
accept any unambiguous indication 1
- (b) **A**
accept any unambiguous indication 1
- (c) mass of the passengers is greater
accept any unambiguous indication 1

[4]

- M8.** (a) tension
accept any unambiguous method of indication eg it's underlined or ticked 1
- (b) (i) speed of the ball is increased 1
- (ii) the direction of the ball

1

(c) centripetal

*accept any unambiguous method of indication
eg it's underlined **or** ticked*

1

[4]

M9. (a) (i) **P**

1

(ii) the child's grip / hold / pull (on the roundabout / bar / rail)

***or** 'the tension in the child's arms'*

accept 'the child's muscles'

accept 'friction between the child and the roundabout'

*do **not** accept just 'friction'*

1

(iii) increases

*accept any unambiguous indication that this ending has
been selected*

1

(b) (i) 360 (Nm)

credit either $240 \times 1 \frac{1}{2}$

***or** 240×1.5 with **1** mark*

2

(ii) move to(wards) the left / to(wards) the / his end

***or** move away from the centre / pivot / axis (of rotation)*

***or** move away from the girl / the child / his daughter*

1

(c) (i) **C** 1

(ii) friction / grip of the car / tyres / wheels (on the road)
do not accept just 'friction / grip' 1

[8]

M10. (a) converging 1

image 1

object 1

image 1

object 1

shorter 1

(b) (i) (Earth's) gravity
accept centripetal
accept minor misspellings, however,
do not credit any response which could be 'centrifugal' 1

(ii) to(wards) (the centre of the) Earth
allow inwards do not accept downwards 1

(c) (i) **either**
friction (force) **or** centripetal force
allow grip 1

between the tyres / wheels and (the surface of) the road
allow on the tyres / wheels
or towards the centre of the bend / arc / circle

1

(ii) mass **or** speed **or** momentum
allow weight allow velocity

1

radius / diameter
*do **not** credit 'curvature' or 'circumference'*

1

(d) centripetal
accept minor misspellings (see above)

1

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