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 × 1 ½
***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

[13]