1. (a) moment = 280 × 0.9

1

moment = 252

1

*allow 252 with no working shown for **2** marks*
*allow 25200 with no working shown for **1** mark*

(b) the clockwise moment (of child B) decreases

1

making it is less than the anticlockwise moment (of child A)

accept so moments are no longer balanced

1

so child A moves downwards

or

so child B moves upwards

1

[5]

2. (a) (force on the chain is) smaller (than the force of the toe)

1

(b) Tick in middle box

The moments are equal and opposite

1

(c) move the toe (up the pedal) away from the pivot

1

[3]

3. (a) turning

1

(b) 420

*allow **1** mark for correct substitution, ie 1400 × 0.30 provided no subsequent step shown*

2

(c) **A**

reason only scores if A is chosen

1

any **one** correct reason:
the force is furthest away (from the pivot)

accept distance (from the pivot) is the greatest

accept it is further away (from the pivot)

accept furthest away from the rock

1

[5]

4. (a) 3000

*allow **1** mark for correct substitution, ie 600 × 5 provided no subsequent step*

2

(b) anticlockwise moment

must be both words

1

(c) (i) 3400

allow 3.4 kilo (newtons)

1

(ii) as the distance (of the girl from point A) increases, force F increases

allow gets bigger for increases

force is (directly) proportional to distance will negate any correct response

1

[5]

5. (a) 38 400

*allow 6.4 × 6000 for **1** mark*

2

Nm **or** newton metres

*do **not** credit 'nm', 'mN' or 'metre newtons'*

1

(b) 16 000 (N) **or** 16 kN

*allow **1** mark for 38 400 ÷ 2.4*

*accept their (a) ÷ 2.4 correctly calculated for **2** marks*

*accept their (a) ÷ 2.4 for **1** mark*

2

[5]

6. (a) 960 (Nm)

1

see-saw is in equilibrium

accept see-saw is balanced

see-saw is stationary is insufficient

1

(total) clockwise moments = anticlockwise moment

accept no resultant moment

forces are balanced is insufficient

*an answer clockwise moments balance the anticlockwise moments gains **2** marks*

1

(b) (i) 600 (Nm)

1

(ii) 375 (N) **or** their (b)(i) ÷ 1.6 correctly calculated

*do **not** credit if (b)(i) is larger than 960*

*allow **1** mark for correct substitution **and** transformation ie*

$\frac{600}{1.6}$ *or* $\frac{\text{their (b)(i)}}{1.6}$

2

[6]

7. (a) (i) turning effect

accept turning force

accept force × distance

(accept symbols only if correctly defined)

*do **not** accept newtons × metres*

1

(ii) stop apparatus falling over

accept holds the stand in place

accept make it safer / stable

references to balanced / equilibrium are insufficient

1

(iii) as x increases y increases

1

in same proportion / ratios

allow both marks for they are directly proportional

or

a specific example eg doubling y, doubles x

allow both marks for a correct answer giving figures

eg they increase in the ratio of 1 to 7

*allow for **1** mark positive correlation*

1

(iv) the centre of mass of the ruler is at the axis of rotation

1

(b) 108

*allow **1** mark for correct substitution ie 240 × 0.45*

2

newton metres / Nm

symbols must be correct

for full credit the unit must be consistent with the numerical answer

1

[8]

8. 300

*allow **1** mark for rearranging equation **or** correct substitution*

[2]

9. (a) **A**

1

(perpendicular) distance between the camera and pivot is greatest

1

(b) increases

1

(c) 5.0 × 9.8

*an answer of 49 scores **2** marks*

1

49

1

newton

allow N

1

(d) moment (of a force) = force × distance

allow M = Fd

1

(e) 144 cm = 1.44 m

*an answer of 70.56 scores **3** marks*

*an answer of 71 scores **3** marks*

1

moment = 49 × 1.44

allow ecf from part (c)

1

moment = 70.56

*answers of 7056 or 7100 score **2** marks*

1

[10]