



# **KS3 Science**

## **Motion**

### **Mark Scheme**

**Time available: 34 minutes**

**Marks available: 46 marks**

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## Mark schemes

1.

(a) exactly 30 N ✓

*if more than one box is ticked, award no mark*

1 (L5)

(b) • gravitational potential

• kinetic

*accept 'gravitational' or 'potential' for gravitational potential*

*award one mark for each correct answer*

*answers must be in the correct order*

2 (L5)

(c) any **one** from

• air resistance

*accept 'drag'*

*'resistance' is insufficient*

• friction

*'upthrust' is insufficient as it is negligible in this case*

*answers must be in the correct order*

1 (L5)

any **one** from

• weight

*accept 'gravity'*

*'thrust' is insufficient*

• gravitational (force)

1 (L5)

(d) any **one** from

• they cushion the impact with water

*accept 'protects organs or muscles'*

*'for protection' is insufficient*

• it acts as a shock absorber

*accept 'to make it buoyant after the dive'*

*accept 'helps them float or get back up'*

*'stops hurting them' is insufficient*

*'slows them down' is insufficient*

*'insulation' or 'keeps them warm' is insufficient*

1 (L6)

- (e) any **two** from
- (both) require oxygen  
*accept 'they (both) use oxygen'*
  - (both) produce carbon dioxide
  - (both) produce water  
*answers referring to energy are insufficient e.g. 'they produce heat'*
- 2 (L6)

[8]

2.

- (a) (i) a number from 8.0 to 8.2 s (inclusive) 1 (L6)
- (ii) a number from 34 to 36 m (inclusive) 1 (L7)
- (iii) 4 s  
*accept response in the range 3.7–4.3* 1 (L7)
- (b) the slope or gradient is constant  
*accept 'it is a straight line'*  
*do **not** accept 'the line is flat'*  
*accept 'steady increase'* 1 (L7)
- (c) (i) points (0, 0) and (15, 30) joined by a straight line  
*accept points drawn to  $\pm 1$  mm* 1 (L7)
- (ii) 50  
*accept  $\frac{100}{2}$*  1 (L7)

[6]

3.

- (a) (i) any **one** from
- add more books  
*accept 'use bigger books'*  
*'change the number of books'*  
***or** 'change the size of the books' are insufficient*
  - make the pile of books higher  
*accept 'lift one end of the ramp higher'*  
*'lift the ramp higher' is insufficient*  
*accept 'bring the ramp closer to the books'*  
*do **not** award a mark for answers implying the use of a different ramp*
- 1 (L3)

(ii) • E 1 (L3)

(iii) any **one** from

- some results are the same  
*accept 'there are two 16s'*  
*do not accept '34'*
- some results do not fit the pattern  
*accept 'to check her results'*  
*accept 'to make it more reliable'*  
*accept 'in case one was an odd result'*  
*'because there was no pattern' is insufficient*  
*do not accept 'to make it a fair test'*

1 (L4)

(b) (i) • 26 cm

1 (L3)

(ii) • increases  
*accept 'goes up'*

1 (L3)

[5]

4.

(a) • 960.000

*accept*  $\frac{192.000.000}{200}$

1 (L7)

- km/day **or** kilometres per day **or** km day<sup>-1</sup>  
*accept '40.000 km/hr' for two marks*  
*accept '11.1 km/s' for two marks*  
*accept '11.111 m/s' for two marks*  
*accept 'd' for 'day' and 'h' for 'hour'*  
*do not accept 'km pday'*

1

(b) • gravity on Mars is less  
*accept 'gravity is greater on Earth'*

1 (L6)

(c) any **one** from

- Mars is further from the Sun  
*accept 'the Sun is closer to the earth'*
- less light reaches Mars  
*accept 'the light rays have spread out more'*  
*'Mars is further away' is insufficient*  
*do **not** accept 'less heat reaches Mars'*

1 (L7)

(d) • 1600

*accept '40/0.025'*

1 (L7)

- $\text{N/m}^2$  **or** Pa **or**  $\text{Nm}^{-2}$

*accept 'pascals'*

*do **not** accept lower case 'n'*

1

**[6]**

**5.**

(a) any suitable independent variable such as

- the surface
- the angle of the slope
- the kind of object
- the size of the push  
*accept specific variations in objects, such as, 'weight'*  
***or** 'mass' **or** 'surface area' **or** 'type of trainer sole'*  
***or** 'type of shoe'*

1 (L4)

(b) any suitable dependent variable such as

- the distance travelled
- the time to move down the ramp
- the force needed to start the object moving
- the angle of the ramp at which the object starts moving  
*accept 'the time to reach a given point'*  
*accept 'angle **or** height of ramp'*  
*accept 'speed'*  
*a dependent variable (DV) without an*  
*independent variable (IV) can gain credit*

1 (L4)

any appropriate equipment to measure the dependent variable such as

- ruler **or** metre rule
- stopwatch **or** timer **or** light gates
- newton meter
- protractor

*accept 'tape measure'*

*accept 'clock'*

*do **not** accept a measurement strategy if a DV is not given  
**or** is incorrect*

**1 (L4)**

(c) any appropriate control variable such as

- the object used
- the angle of the slope
- the surface used
- the height of the ramp
- the length of the ramp

*accept 'distance travelled'*

*only give credit for a control variable which does  
not conflict with the suggested investigation*

**1 (L4)**

**[4]**

6.

(a) A

1 (L5)

(b) any **one** from

- he will remain stationary  
*accept 'he floats'*
- he will continue moving at a constant speed  
*accept 'nothing'*

1 (L6)

any **one** from

- there is no net force
- the pairs of forces are equal  
*accept 'all the forces cancel out'*  
*accept 'they cancel each other out'*  
*accept 'the forces are balanced'*  
*'the forces are equal' is insufficient*

1 (L6)

(c) ↗

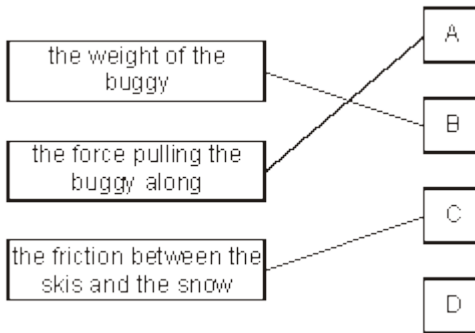
*accept any arrow drawn going up and to the right*

1 (L6)

[4]

7.

(a)



*if more than one line is drawn from any one force award no mark for that force*

3 (L3)

(b) 800

*accept '80 x 10'*

1 (L4)

- (c) any **one** from
- it weighed more
  - the mass was greater  
*accept 'it was heavier'*
  - it weighed less at the end  
*accept 'it only weighed 130 at the end'*  
*accept 'there was more food **or** fuel **or** supplies'*  
*accept 'more pressure'*
- 1 (L4)

- (d) any **one** from
- they spread out the weight  
*accept 'they do not sink into the snow'; 'wheels sink'*
  - they have a bigger surface **or** area
  - they can slide easily  
*accept 'they reduce the pressure'; 'less friction'*  
*'they are bigger'; 'it can slide' is insufficient*
- 1 (L4)

- (e) any **one** from
- there is a bigger surface **or** area
  - there is a bigger force
  - it catches more air **or** wind  
*do **not** accept 'there is more air resistance'*
- 1 (L4)

[7]

8.

- (a) 180 seconds: the parachute opened
- 1
- 360 seconds: she landed  
*answers must be in the correct order*  
*do **not** accept 'her speed dropped'*
- 1

- (b) any **one** from
- the slope of the graph decreases **or** the curve gets less steep
  - the graph begins to level out
  - the acceleration gets less  
*accept 'it curves between A and B'*
- 1



(c) B and D

*letters may be in either order*  
**both** letters are required for the mark

1

(d) (i) any answer between 1000 m and 1350 m  
*the unit is required for the mark*

1

(ii) because its speed takes time to reach 6 m/s  
*accept 'because the speed is not constant'*

- because it was slowing down at first
- because the speed is difficult to read  
*accept 'because the speed may not be exactly 6 m/s'*  
*accept 'because the graph curves at the corner'*

1

**[6]**