



Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. displacement
2. vector
3. scalar
4. velocity
5. weight
6. friction
7. joule
8. watt

K • 4

Each carries 0.5 mark.

2 Multiple choice

i. c. J

K • 1

Work is measured in joules (J). W (watt) and hp (horsepower) are units of power; N (newton) is the unit of force.

ii. b. Sliding friction is greater than rolling friction.

U • 1

It takes much more force to slide a block than to roll it on pencils (Activity 6.9), so sliding friction is greater. Rough surfaces give more friction, and a wet path gives less: that is why you slip on it.

iii. d. Weight is a vector quantity because it always acts towards the Earth's center.

U • 1

Weight is a force with a definite direction (towards the Earth's center), so it is a vector. Distance is a scalar because it has no direction.

iv. b. His distance is 70 m, but his displacement is 0.

A • 1

He walked 70 m, so the distance is 70 m. He ended where he started, so his displacement is zero.

v. b. its speed stays the same, but its velocity changes

A • 1

The speedometer stays at 40 km/h, so the speed is constant. But on a circle the car's direction changes every moment, and velocity includes direction, so the velocity changes all the time.

3 Label the diagram

- | | |
|------------|---------------------|
| 1. spring | 4. small stone: 2 N |
| 2. pointer | 5. scale (newtons) |
| 3. hook | 6. big stone: 6 N |

A • 3

Each carries 0.5 mark.

4 Very short answers

a. MARKING SCHEME

K • 1

✓ 9.8 m/s².

b. MARKING SCHEME

K • 1

✓ Spring balance.

c. MARKING SCHEME

K • 1

✓ 1000 W (10³ W).



5 Short answers

a. MARKING SCHEME

U • 2

- ✓ Any one difference, e.g. speed is the distance covered in unit time; velocity is the displacement in unit time.
- ✓ Any second difference, e.g. speed is a scalar (no direction), velocity a vector (with direction).

b. MARKING SCHEME

U • 2

- ✓ Necessary: we can't walk, grip, brake or hold things without it (any one example).
- ✓ Evil: it wastes energy as heat, lowers efficiency and wears out parts.

c. MARKING SCHEME

K • 2

- ✓ Any one way, e.g. lubricants (oil, grease) between moving parts.
- ✓ Any second way, e.g. wheels and ball bearings, polishing, or streamlining.

d. MARKING SCHEME

U • 2

- ✓ No.
- ✓ Work needs the object to move in the direction of the force; the wall doesn't move, so $W = F \times 0 = 0$.

6 Long answer

ANSWER

U • 4

Distance is the total length of the path an object travels. It has only magnitude, so it is a scalar. Example: a student walks 500 m along a winding lane from home to school; the distance is 500 m.

Displacement is the shortest, straight-line distance from the starting point to the end point, in a particular direction. It has magnitude and direction, so it is a vector. Example: if the school is 300 m east of the home in a straight line, the displacement is 300 m east. After a round trip (home to school and back), the distance is 1000 m but the displacement is zero.

MARKING SCHEME

- ✓ Distance: the total length of the path traveled; a scalar.
- ✓ An example of distance (e.g. 500 m along a winding lane).
- ✓ Displacement: the shortest straight-line distance from start to end in a particular direction; a vector.
- ✓ An example of displacement (e.g. 300 m east), or a round trip having zero displacement.

7 Numerical problems

a. ANSWER

A • 2

distance = speed $\times$ time = $20 \text{ m/s} \times 10 \text{ s} = 200 \text{ m}$

MARKING SCHEME

- ✓ distance = speed $\times$ time = $20 \text{ m/s} \times 10 \text{ s}$.
- ✓ 200 m.

b. ANSWER

A • 4

- i. Weight = $m \times g = 50 \times 9.8 = 490 \text{ N}$; work against gravity = weight $\times$ height = $490 \text{ N} \times 3 \text{ m} = 1470 \text{ J}$.
- ii. Work against friction = force $\times$ distance = $450 \text{ N} \times 4 \text{ m} = 1800 \text{ J}$.

MARKING SCHEME

- ✓ i. Weight = $m \times g = 50 \times 9.8 = 490 \text{ N}$.
- ✓ Work against gravity = $490 \text{ N} \times 3 \text{ m} = 1470 \text{ J}$.
- ✓ ii. Work against friction = force $\times$ distance = $450 \text{ N} \times 4 \text{ m}$.
- ✓ 1800 J.



8 Think

ANSWER

HA - 2

Power = work ÷ time. If both do the same work in the **same time**, their power is the **same**. If one takes **less time** than the other for the same work, that person has **more power**. For example, if Dataram digs a field in 3 hours and Sohan digs the same field in 2 hours, Sohan's power is greater.

MARKING SCHEME

- ✓ Power = work ÷ time: if both take the same time, their power is the same.
- ✓ If one takes less time for the same work, that person has more power (e.g. Sohan, 2 hours, more than Dataram, 3 hours).

9 Activity: Sliding and rolling (Activities 6.7 and 6.9)

(not marked)

WHAT STUDENTS SHOULD FIND

The wide face and the narrow side give nearly the same reading: friction hardly depends on the area touching the floor. With a second block on top the reading is about twice as much: friction increases when the surfaces are pressed together harder. Rolling on pencils needs much less force than sliding: rolling friction is much less than sliding friction.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	10	12	11	2	35

