

Past-paper walk-through

Physical quantities and measurement techniques ■ 1.1

eXercise

Questions in this set

- 0625/21 N25 Q1 ■ 1 mark
- 0625/21 N25 Q3 ■ 1 mark
- 0625/22 N25 Q1 ■ 1 mark
- 0625/23 N25 Q1 ■ 1 mark
- 0625/42 N25 Q1 ■ 8 marks
- 0625/41 J25 Q1 ■ 8 marks
- 0625/21 J24 Q1 ■ 1 mark
- 0625/21 N23 Q1 ■ 1 mark

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 1

0625/21 N25 ■ Q1 ■ 1 mark

1 A student determines the diameter of a metal ball.

Which apparatus is needed to get an accurate measurement?

- A** a ruler and a protractor
- B** a ruler only
- C** a protractor and a set square

Question 1

D a ruler and two rectangular blocks

Solution 1

Answer: **D**

Why

- A ball's widest point cannot be lined up against a ruler directly.
- Place two flat blocks or set squares either side of the ball, just touching it.
- The distance between them, read off the ruler, is the diameter.

Question 3

0625/21 N25 ■ Q3 ■ 1 mark

- 3 A piece of paper torn out of an exercise book is shown.

	describes how a massive object affects
	the space around it, including the size and
	direction of the force it would exert on other
	objects placed in that space.

What is being described?

Question 3

- A** gravitational charge
- B** gravitational field
- C** gravitational mass
- D** gravitational potential energy

Solution 3

Answer: **B**

Why

- A region in which a mass experiences a force is a *field*.
- For gravity that is the gravitational field.
- Charge belongs to electric fields, and gravitational potential energy is a quantity, not a region.

Question 1

0625/22 N25 ■ Q1 ■ 1 mark

1 Which quantities are both vectors?

A acceleration and force

B acceleration and pressure

- C** density and force
- D** density and pressure

Solution 1

Answer: **A**

Why

- A vector has direction as well as size.
- Acceleration is a rate of change of velocity and force acts in a direction, so both are vectors.
- Density and pressure have no direction, so they are scalars.

Question 1

0625/23 N25 ■ Q1 ■ 1 mark

- 1** When a pendulum passes a marker, a timer displays 1 minute 30 seconds.
- The pendulum passes the marker 12 more times from the same direction.
- On the final pass, the timer displays a time of 2 minutes 18 seconds.
- What is the time period of oscillation of the pendulum?
- A** 4.0 s **B** 4.4 s **C** 7.5 s **D** 12 s

Solution 1

Answer: **A**

Why

- Passing the marker *from the same direction* happens once per complete swing, so each pass is one period.
- 12 periods take $138 - 90 = 48$ s.
- $T = 48/12 = 4.0$ s.

Question 1

0625/42 N25 ■ Q1 ■ 8 marks

- 1 (a) (i)** State the difference between a scalar quantity and a vector quantity.

Question 1

- (ii) In the list below, draw a line under each of the quantities that is a scalar quantity.

acceleration

mass

momentum

electric field strength

energy

temperature

[2]

- (b) A tennis player throws a tennis ball into the air. The mass of the tennis ball is 5.8×10^{-2} kg. The tennis ball leaves the tennis player's hand and reaches a maximum height of 5.0 m above the point of release.
- (i) Show that the initial velocity of the tennis ball is 9.9 m/s upwards.

Question 1

[3]

- (ii) Calculate the momentum of the tennis ball as it leaves the tennis player's hand.

Question 1

[Total: 8]

Solution 1

(a)(i)

Mark scheme

- scalar has magnitude (size) only OR vector has (magnitude and) direction

(a)(ii)

Mark scheme

- mass, energy and temperature
- all correct and no additional quantities 2 marks
- 2 correct and no additional quantities 1 mark

Solution 1

(b)(i)

Mark scheme

- decrease in kinetic energy = increase in gravitational (potential) energy OR
- $\frac{1}{2} mv^2 = mg(\Delta)h$
- $v^2 = 2gh$ OR $v^2 = 2 \times 9.8 \times 5.0$ OR $v^2 = 98$
- $v = \sqrt{98}$ OR 9.899

Solution 1

(b)(ii)

Mark scheme

- 0.57 kg m / s (upwards) OR 0.57 Ns (upwards)
- (momentum =) mv OR $5.8 \times 10^{-2} \times 9.9$
- 0625/42
- October/November 2025

Question 1

0625/41 J25 ■ Q1 ■ 8 marks

- 1 (a) Circle the vector quantities in the list.

acceleration

mass

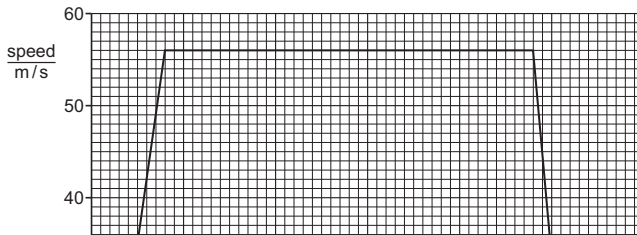
speed

time

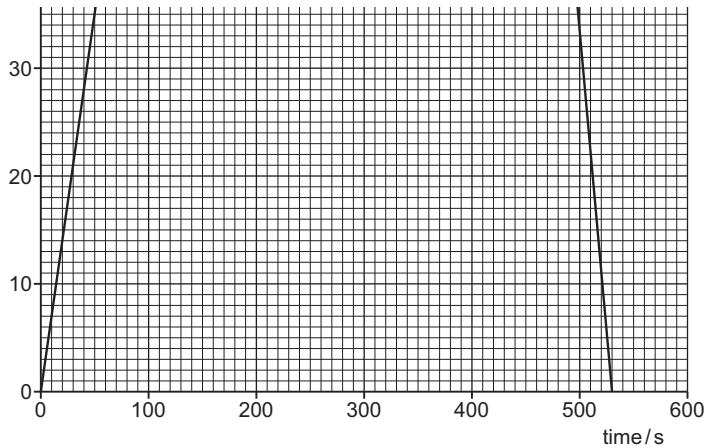
velocity

[1]

- (b) Fig. 1.1 shows the speed–time graph for a train travelling from station A to station B.



Question 1



Question 1

Fig. 1.1

- (i) State the maximum speed of the train.

Question 1

- (ii) Describe the motion of the train between station A and station B.

Question 1

- (iii) Calculate the distance between station A and station B.

Question 1

- (iv) On a different day, the train takes 650 s to travel between station A and station B.

Suggest **one** change to the motion of the train that leads to this longer journey time.

Question 1

[Total: 8]

Solution 1

(a)

Mark scheme

- (only) acceleration AND velocity circled

Solution 1

(b)(i)**Mark scheme**

- 56 m / s
- braille: 55 m / s

Solution 1

(b)(ii)

Mark scheme

- accelerates OR speed increases
- AND
- (then) constant speed
- AND
- (then) decelerates OR speed decreases
- constant acceleration OR constant deceleration

Solution 1

(b)(iii) Mark scheme

- 26 000 m OR 26 km
- braille: 26 125 m
- (distance =) area under the speed–time graph OR
- (distance =) average speed $\times$ time taken
- $\times$
- $\times$
- 0.5 80 56 AND
- $\times$

Solution 1

- 56
- 400 AND
- $\times$
- $\times$
- 0.5 50 56
- OR
- $\times$
- +
- $\times$
- 1

Solution 1

- 400
- 530
- 56
- 2
- braille: $0.5 \times 100 \times 55$ AND 55×400 AND $0.5 \times 50 \times 55$
- OR
- 1
- $\{400 + 550\} 55$
- $2 \times$
- $\times$

Solution 1

(b)(iv) Mark scheme

- any one from:
 - ■
- lower acceleration OR less acceleration
- ■
- lower deceleration OR less deceleration
- ■
- lower maximum speed OR lower average speed OR lower constant speed
- 0625/41

Solution 1

- May/June 2025

Question 1

0625/21 J24 ■ Q1 ■ 1 mark

- 1 In which row are quantities correctly categorised into scalar quantities and vector quantities?

	scalar quantities	vector quantities
A	mass and energy	weight and acceleration
B	gravitational field strength and time	force and electric field strength
C	speed and momentum	distance and force
D	distance and energy	velocity and temperature

Solution 1

Answer: **A**

Why

- A vector has both size and direction; a scalar has size only.
- Mass and energy have no direction, so they are scalars.
- Weight is a force and acceleration is a rate of change of velocity, so both are vectors.

Question 1

0625/21 N23 ▪ Q1 ▪ 1 mark

1 Which is a vector quantity?

A density

B mass

C pressure

D weight

Solution 1

Answer: **D**

Why

- A vector has direction as well as size.
- Weight is a force, and forces always act in a particular direction.
- Density, mass and pressure are all scalars – they have size only.