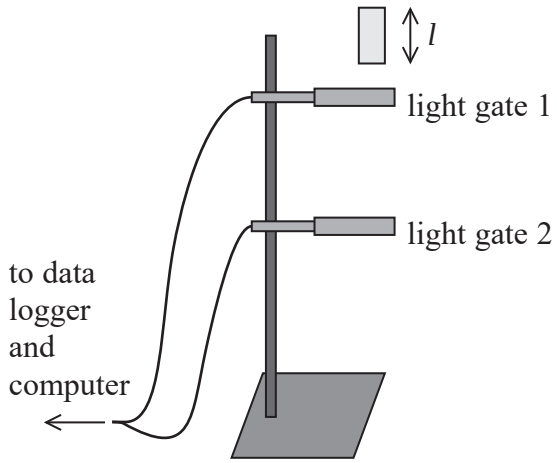
1 An experiment is carried out to find a value for g, the acceleration of free fall.

A weighted card of known length l is dropped through two light gates. The light gates are attached to a data logger and a computer. By inputting the length of the card into the computer two values of velocity and the time interval between them can be obtained. Using these values of velocity, a value of g can be determined.



Assuming that air resistance is negligible, which of the following would produce a more reliable value of g?

☒ **A** Drop the card from a greater height.

☒ **B** Ensure that the card is dropped from rest.

☒ **C** Make the card shorter.

☒ **D** Move the light gates further apart.

(Total for Question = 1 mark)

2 Which pair of quantities does **not** contain a vector and a scalar?

☒ **A** acceleration and time

☒ **B** force and displacement

☒ **c** mass and acceleration

☒ **D** velocity and time

(t otal for Question = 1 mark)

3 Which of these quantities is **not** measured in an SI base unit?

☒ **A** distance

☒ **B** force

☒ **C** mass

☒ **D** time

(Total for Question = 1 mark)

4 Which equation shows a scalar quantity as the product of two vector quantities?

☒ **A** energy = power × time

☒ **B** force = stiffness × extension

☒ **C** mass = density × volume

☒ **D** work = force × displacement

(Total for Question = 1 mark)

5 Which of the following is a scalar quantity?

☒ **A** acceleration

☒ **B** displacement

☒ **C** force

☒ **D** work

(Total for Question = 1 mark)

6 Which of the following units could be used for power?

☒ **A** kg m s^{-2}

☒ **B** kg m^2 s^{-2}

☒ **C** kg m^2 s^{-3}

☒ **D** kg^2 m^2 s^{-3}

(Total for Question = 1 mark)

7 Which set of quantities is all scalar?

☒ **A** acceleration, displacement, velocity

☒ **B** energy, mass, power

☒ **C** extension, force, gravitational potential energy

☒ **D** weight, kinetic energy, work

(Total for Question = 1 mark)

8 Physical quantities are either scalars or vectors.

Select the row of the table which correctly identifies a scalar quantity and a vector quantity.

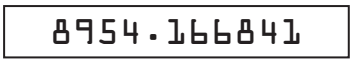
	Scalar	Vector
☒ **A**	force	velocity
☒ **B**	mass	time
☒ **C**	time	force
☒ **D**	velocity	mass

(Total for Question = 1 mark)

9 A student takes measurements for a piece of copper wire.

Mass	0.00500 kg
Length	3.36 m
Diameter	0.00046 m

The student uses these values to calculate a value for the density of copper. The correctly calculated value of density is shown on the student's calculator as



The student should state the density as

☒ **A** 8954.166841 kg m^{-3}

☒ **B** 8950 kg m^{-3}

☒ **C** 8.95×10^3 kg m^{-3}

☒ **D** 9.0×10^3 kg m^{-3}

(Total for Question = 1 mark)

10 In which of the following is a vector fully described?

☒ **A** A car travels north.

☒ **B** A crane moves a load 20 m east.

☒ **C** A train travels at a rate of 35 m s^{-1}.

☒ **D** A lift moves upwards with a kinetic energy of 2.5 kJ.

(Total for Question = 1 mark)

11 Which of the following is a correct statement?

☒ **A** Weight is a base quantity.

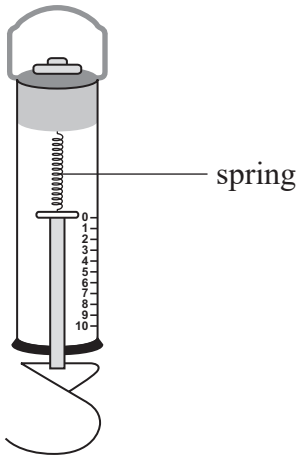
☒ **B** Velocity is a base quantity.

☒ **C** Mass is a derived quantity.

☒ **D** Force is a derived quantity.

(Total for Question = 1 mark)

12 The main component of a newton meter is a calibrated spring.



The newton meter is to be used over a greater range of forces. Which of the following should be increased to allow this?

☒ **A** ductility of the spring wire

☒ **B** precision of the scale

☒ **C** stiffness of the spring

☒ **D** ultimate tensile strength of the spring

(Total for Question = 1 mark)

13 Which statement about scalar and vector quantities is correct?

☒ **A** Scalars have direction only.

☒ **B** Scalars have distance only.

☒ **C** Vectors have magnitude and direction.

☒ **D** Vectors have magnitude and distance.

(Total for Question = 1 mark)

14 Which of the following is a unit equivalent to the pascal?

☒ **A** kg m s^{-1}

☒ **B** kg m s^{-2}

☒ **C** kg m^{-1} s^{-2}

☒ **D** kg m^{-2} s^{-2}

(Total for Question = 1 mark)

15 Which table is correct for scalar and vector quantities?

☒ **A**

	has magnitude	has a direction
scalar	✓	✓
vector	✗	✓

☒ **B**

	has magnitude	has a direction
scalar	✗	✓
vector	✓	✓

☒ **C**

	has magnitude	has a direction
scalar	✓	✗
vector	✓	✓

☒ **D**

	has magnitude	has a direction
scalar	✓	✓
vector	✓	✗

(Total for Question = 1 mark)

16 Which of the following is **not** a unit of energy?

☒ **A** $N\ s^{-1}$

☒ **B** kW h

☒ **C** N m

☒ **D** W s

(Total for Question = 1 mark)

17 Which of the following is a vector quantity?

☒ **A** distance

☒ **B** force

☒ **C** speed

☒ **D** work

(Total for Question = 1 mark)

18 Which of the following is a scalar quantity?

☒ **A** displacement

☒ **B** force

☒ **C** time

☒ **D** velocity

(Total for Question = 1 mark)

19 Which of the following is not a SI base quantity?

☒ **A** force

☒ **B** length

☒ **C** mass

☒ **D** time

(Total for Question = 1 mark)

20 The table shows some physical quantities. Which row correctly identifies scalar and vector quantities?

		Scalar	Vector
☒	**A**	distance	acceleration
☒	**B**	time	speed
☒	**C**	velocity	force
☒	**D**	work	power

(Total for Question = 1 mark)

21 Which of these units is the same as the newton?

☒ **A** kg m s^{-1}

☒ **B** kg m s^{-2}

☒ **C** kg m^2 s^{-2}

☒ **D** kg m^2 s^{-3}

(Total for Question = 1 mark)

22 Which pair of quantities does **not** contain a vector and a scalar?

☒ **A** acceleration and time

☒ **B** force and displacement

☒ **c** mass and acceleration

☒ **D** velocity and time

(t otal for Question = 1 mark)

23 Which of the following is a derived SI quantity?

☒ **A** force

☒ **B** length

☒ **c** second

☒ **D** watt

(t otal for Question = 1 mark)

24 Which of the following is a possible unit for rate of change of momentum?

☒ **A** kg m s^{-2}

☒ **B** kg m s^{-1}

☒ **c** N s^{-1}

☒ **D** N s

(t otal for Question 5 = 1 mark)

25 A correct unit for radiant energy flux is

☒ **A** N m^{-1} s^{-1}

☒ **B** Nm^{-1}

☒ **C** W

☒ **D** W m^2

(Total for Question = 1 mark)

26 Which of the following is a possible unit for rate of change of momentum?

☒ **A** kg m s^{-1}

☒ **B** kg m s^{-2}

☒ **C** N s

☒ **D** N s^{-1}

(Total for Question = 1 mark)

27 A unit of electric field strength is

☒ **A** J C^{2}

☒ **B** N m^{2} C^{2}

☒ **C** N m C^{1}

☒ **D** N C^{1}

(Total for Question 4 1 mark)