

Topical Past Papers (2002-2015)

Cambridge International AS and A Level
Physics Paper 1

9702

Fully updated classified Past Papers with variants included and years mentioned.

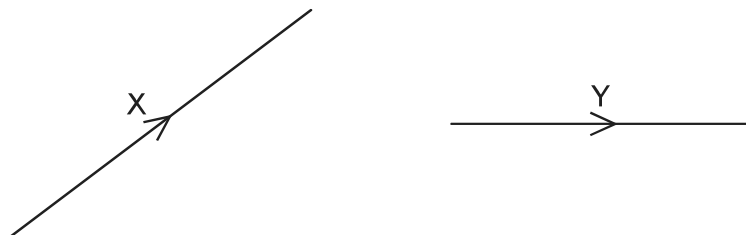
Contents

- Physical quantities and units
- Measurement and its techniques
- Kinematics
- Kinematics (graphs)
- Projectiles
- Forces
- Dynamics
- Elastic properties
- Phases of matter
- Electric field
- Current Electricity
- Waves
- Superposition
- Nuclear physics

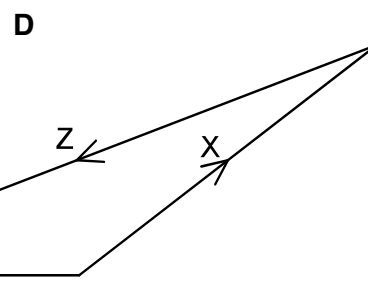
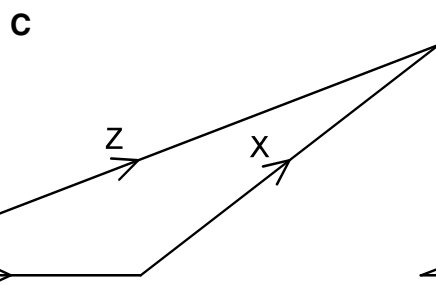
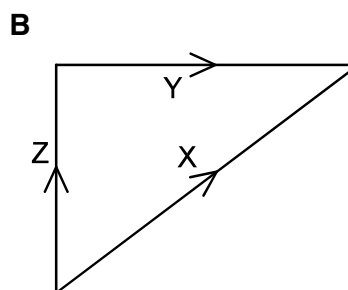
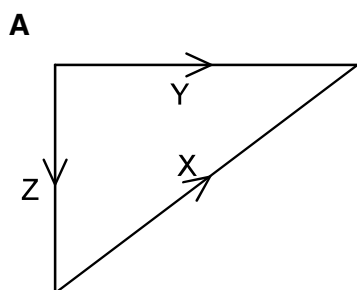
1 Which of the following pairs of units are both SI base units? 9702/1/M/J/02/Q1

- A ampere, degree celsius
- B ampere, kelvin
- C coulomb, degree celsius
- D coulomb, kelvin

2 The diagram shows two vectors X and Y. 9702/1/M/J/02/Q2



In which vector triangle does the vector Z show the magnitude and direction of vector $X - Y$?



3 Which formula could be correct for the speed v of ocean waves in terms of the density ρ of sea-water, the acceleration of free fall g , the depth h of the ocean and the wavelength λ ? 9702/1/M/J/02/Q3

- A $v = \sqrt{g\lambda}$
- B $v = \sqrt{\frac{g}{h}}$
- C $v = \sqrt{\rho gh}$
- D $v = \sqrt{\frac{g}{\rho}}$

4 Which of the following is a scalar quantity? 9702/01/M/J/03/Q1

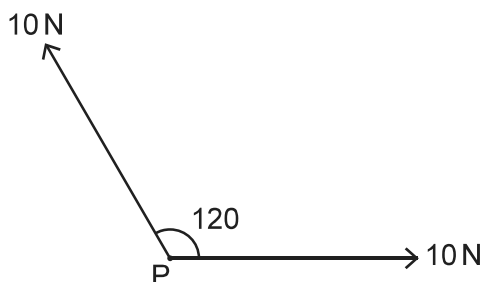
- A acceleration
- B mass
- C momentum
- D velocity

5 The unit of work, the joule, may be defined as the work done when the point of application of a force of 1 newton is moved a distance of 1 metre in the direction of the force. 9702/01/M/J/03/Q2

Express the joule in terms of the base units of mass, length and time, the kg, m and s.

- A $\text{kg m}^{-1} \text{s}^2$ B $\text{kg m}^2 \text{s}^{-2}$ C $\text{kg m}^2 \text{s}^{-1}$ D kg s^{-2}

6 Two forces, each of 10 N, act at a point P as shown in the diagram. The angle between the directions of the forces is 120° . 9702/01/M/J/03/Q3



What is the magnitude of the resultant force?

- A 5 N B 10 N C 17 N D 20 N

7 A student measures a current as 0.5 A. 9702/01/O/N/03/Q1

Which of the following correctly expresses this result?

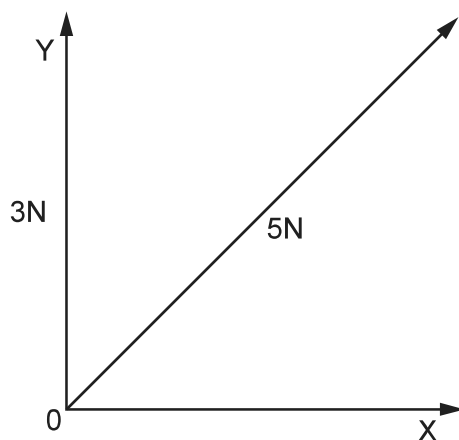
- A 50 mA B 50 MA C 500 mA D 500 MA

8 The momentum of an object of mass m is p . 9702/01/O/N/03/Q3

Which quantity has the same base units as $\frac{p^2}{m}$?

- A energy
- B force
- C power
- D velocity

- 9 A force of 5 N may be represented by two perpendicular components OY and OX as shown in the diagram, which is **not** drawn to scale. 9702/01/O/N/03/Q2



OY is of magnitude 3 N.

What is the magnitude of OX?

- A** 2 N **B** 3 N **C** 4 N **D** 5 N

- 10 Which pair contains one vector and one scalar quantity? 97 2 1 4/Q1

- A** displacement acceleration
B force kinetic energy
C momentum velocity
D power speed

- 11 Which of the following could be measured in the same units as force? 97 2 1 4/Q2

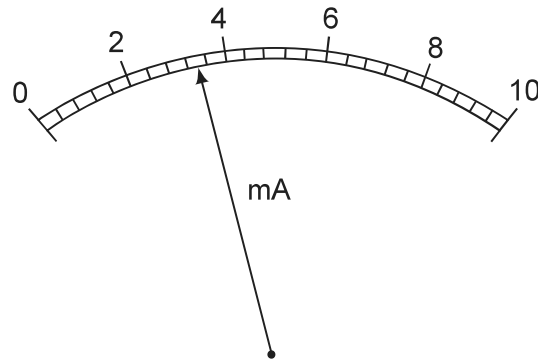
- A** energy distance
B energy distance
C energy time
D momentum distance

- 12 The notation s is used as an abbreviation for a certain unit of time. 97 2 1 4/Q3

What is the name and value of this unit?

	name	value
A	microsecond	1 s
B	microsecond	1 ³ s
C	millisecond	1 s
D	millisecond	1 ³ s

- 13 What is the reading shown on this milliammeter 97 2 1 4/Q4



- A 2.3 mA B 2.7 mA C 3.4 mA D 3.7 mA
- 14 Which of the following are equivalent to a time of 1 second and a distance of 1 metre 97 2 1 4/Q1

	time of 1 s	distance of 1 m
A	10^9 s	10^9 m
B	10^9 s	10^{12} m
C	10^{12} s	10^9 m
D	10^{12} s	10^{12} m

- 15 Which of the following definitions is correct and uses only quantities rather than units 97 2 1 4/Q2

- A Density is mass per cubic metre
- B Potential difference is energy per unit current
- C Pressure is force per unit area
- D Speed is distance travelled per second

- 16 When a beam of light is incident on a surface it delivers energy to the surface. The intensity of the beam is defined as the energy delivered per unit area per unit time 97 2 1 4/Q3

What is the unit of intensity expressed in base units

- A $\text{gm}^2 \text{s}^{-1}$ B $\text{gm}^2 \text{s}^{-3}$ C gs^{-2} D gs^{-3}
- 17 An atom of mass 8 g completes in a 1 m race 97 2 1 /Q3
- What is the best estimate of its mean kinetic energy during the race
- A 4×10^{-2} B 4×10^{-3} C 4×10^{-4} D 4×10^{-1}

- 18 Decima su muti es an muti es o units are in icate using a re i to t e unit or e am e t e re i mi i m re resents 10^3 97 2 1 /Q1

ic o t e o o ing gi es t e su muti es or muti es re resente ico an giga

	ico	giga
A	10^9	10^9
B	10^9	10^{12}
C	10^{12}	10^9
D	10^{12}	10^{12}

- 19 A meta s ere o ra ius r is ro e into a tan o ater As it sin s at s ee it e eriences a rag orce gi en r ere is a constant 97 2 1 /Q2

at are t e ase units o

- A gm^2s^{-1} B gm^2s^{-2} C $\text{gm}^{-1}\text{s}^{-1}$ D gms^{-2}

- 20 ic air o units are ot ase units 97 2 1 /Q1

- A am ere egree ce sius
B am ere e in
C cou om egree ce sius
D cou om e in

- 21 e re i centi in icates 10^{-2} 97 2 1 /Q2

ic ine in t e ta e correct in icates t e re i es micro nano an ico

	10^{12}	10^9	1
A	nano	micro	ico
B	nano	ico	micro
C	ico	nano	micro
D	ico	micro	nano

- 22 ic e ression in o ing ase units is e ui a ent to t e ot 97 2 1 /Q3

- A $\text{gm}^2\text{s}^{-1}\text{A}^{-1}$
B gms^{-2}A
C $\text{gm}^2\text{s}^{-1}\text{A}$
D $\text{gm}^2\text{s}^{-3}\text{A}^{-1}$

23 Which pair includes a vector quantity and a scalar quantity 97 2 1 /Q1

- A displacement acceleration
- B force kinetic energy
- C power speed
- D work potential energy

24 Which quantity is the magnitude of a reasonably estimate 97 2 1 /Q2

- A frequency of a radio wave
- B mass of an atom g
- C thickness of a metal plate a
- D wavelength of green light nm

25 Which of the following physical quantities can be either positive or negative 97 2 1 /Q3

displacement of a particle along a straight line

θ temperature on the Celsius scale

electric charge

readings on a digital thermometer

Which of these quantities are vectors

- A s θ
- B s
- C θ
- D s on

26 In the expressions below 97 2 1 /Q2

a is acceleration

F is force

m is mass

t is time

v is velocity

Which expression represents energy

- A vt
- B vt^2
- C $\frac{2m}{t}$
- D $\frac{at^2}{2}$

27 Which of the following is the greatest magnitude? 97 2 1 /Q1

- A pico mega
- B nano io
- C micro giga
- D milli tera

28 Which of the following is a scalar quantity and its correct unit? 97 2 1 /Q3

	scalar quantity	unit
A	electric field strength	$\text{gms}^{-2}\text{C}^{-1}$
B	scalar electric potential	$\text{g}^{-1}\text{m}^2\text{s}^{-2}\text{A}^{-1}$
C	tension strain	$\text{gm}^{-1}\text{s}^{-2}$
D	time of flight	$\text{gm}^{-1}\text{s}^{-3}$

29 Which of the following are base units? 97 2 1 7/Q1

A	ampere	coulomb
B	coulomb	second
C	kilogram	metre
D	metre	newton

30 What is the ratio $\frac{1\mu\text{m}}{1\text{m}}$? 97 2 1 7/Q2

- A 10^{-3}
- B 10^{-9}
- C 10^{-12}
- D 10^{-1}

31 Which formula correctly relates the speed of a wave in terms of the density ρ of the medium, the acceleration of gravity g and the wavelength λ ? 97 2 1 7/Q3

- A $\sqrt{g\lambda}$
- B $\sqrt{\frac{g}{\lambda}}$
- C $\sqrt{\rho g}$
- D $\sqrt{\frac{g}{\rho}}$

32 Which of the following is the correct expression for the resistance in terms of base units? 97 2 1 8/Q2

- A $\text{A}\Omega$
- B A^{-1}
- C $\text{gm}^2\text{s}^{-1}\text{A}^{-1}$
- D $\text{gm}^2\text{s}^{-3}\text{A}^{-1}$

33 The equation relating pressure and density is $p = \rho gh$ 97/2/1 7/Q1

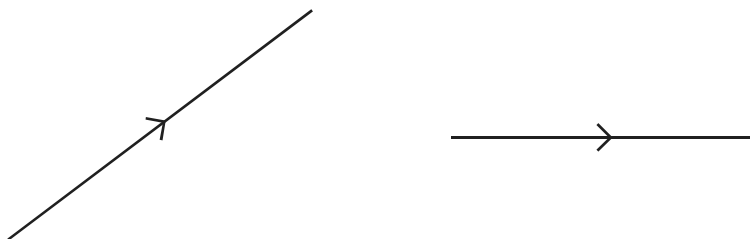
Which of the following is the equation written in terms of base units

- A $\text{m}^{-1} \text{gm}^3 \text{ms}^{-1} \text{m}$
 B $\text{m}^{-2} \text{gm}^3 \text{ms}^{-2} \text{m}$
 C $\text{gm}^{-1} \text{s}^{-2} \text{gm}^3 \text{ms}^{-2} \text{m}$
 D $\text{gm}^{-1} \text{s}^{-1} \text{gm}^{-1} \text{ms}^{-2} \text{m}$

34 What is a reasonable estimate of the diameter of an alpha particle 97/2/1 7/Q2

- A 10^{-1}m B 10^{-12}m C 10^{-9}m D 10^{-1}m

35 The diagrams show vectors and

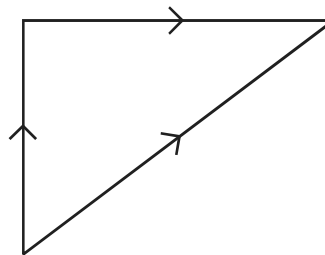
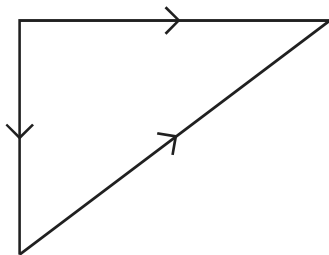


Which vector triangle shows the vectors so that the magnitude and direction of the vector

97/2/1 7/Q3

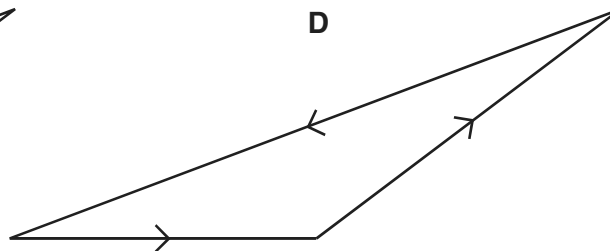
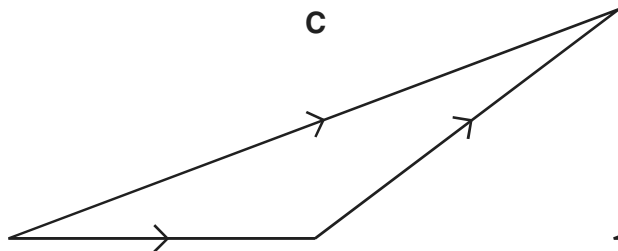
A

B



C

D



36 i e energies are iste 97 2 1 8/Q1

m

n

tarting it t e sma est irst at is t e or er o increasing magnitu e o t ese energies

A → m → → n

B n → → → m

C n → m → →

D m → n → →

37 at is a reasona e estimate o t e a erage inetic energ o an at ete uring a 1 m race
t at ta es 1 s 97 2 1 8/Q3

A 4

B 4

C 4

D 4

38 At tem eratures cose to t e s eci ic eat ca acit c o a articu ar so i is gi en c³
ere ist e t ermo namic tem erature an is a constant c aracteristic o t e so i

at are t e units o constant e resse in ase units

97 2 1 8/Q2

A $m^2 s^{2-3}$

B $m^2 s^{2-4}$

C $gm^2 s^{2-3}$

D $gm^2 s^{2-4}$

39 e ta es o s t e com onent an com onent o our orce ectors 97 2 1 8/Q3

ic orce ector as t e argest magnitu e

	com onent	com onent
A	2	9
B	3	8
C	4	7
D		

40 A laser emits light of wavelength 633 nm

97 2 1

8/Q1

What is the distance between successive wavefronts of the light in one second

A $1.8 \times 10^8 \text{ m}$ B $1.11 \times 10^{11} \text{ m}$ C $1.14 \times 10^{14} \text{ m}$ D $1.17 \times 10^{17} \text{ m}$

41 Which statement in the following is a correct statement about the unit metre m

97 2 1

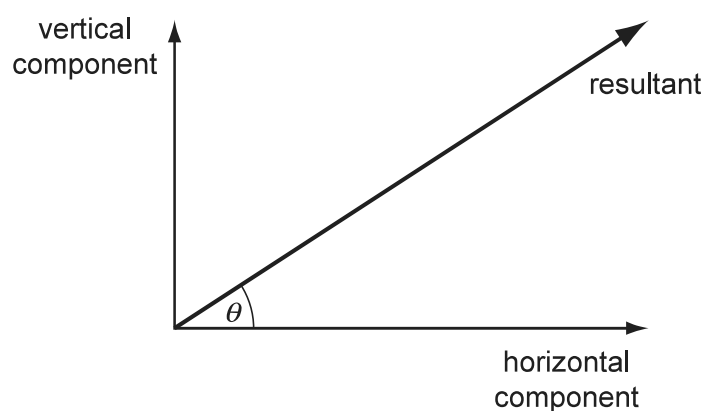
9/Q1

A $1 \text{ m} = 10^9 \text{ m}$ B $1 \text{ nm} = 10^{-9} \text{ m}$ C $1 \text{ mm} = 10^{-3} \text{ m}$ D $1 \text{ m} = 10^{-3} \text{ mm}$

42 The diagram shows a resultant force and its horizontal and vertical components

97 2 1

9/Q2



The horizontal component is 2 N and $\theta = 30^\circ$. What is the vertical component

A 8.7 N B 1 N C 11 N D 17.3 N

43 The table contains some quantities together with their SI units

97 2 11

9/Q2

quantity	SI unit	unit
gravitational strength	g	m s^{-2}
density	ρ	kg m^{-3}
vertical height		m
volume of water		m^3

Which expression has the units of energy

A $g\rho$ B $\frac{\rho}{g}$ C ρg D ρg^2

- 44 The drag force acting on a moving sphere of radius r is given by the equation $F = k v$, where F represents the drag force, v represents the speed of the sphere and k is a constant. The SI units of k are

A $\text{kg m}^{-2} \text{s}^{-1}$ B $\text{kg m}^{-2} \text{s}^{-1}$ C $\text{kg m}^{-3} \text{s}^{-1}$ D $\text{kg m}^{-4} \text{s}^{-2}$

What are the base units of the constant k ?

- A gm s^{-4} B $\text{gm}^2 \text{s}^{-1}$ C gm^3 D $\text{gm}^4 \text{s}^2$

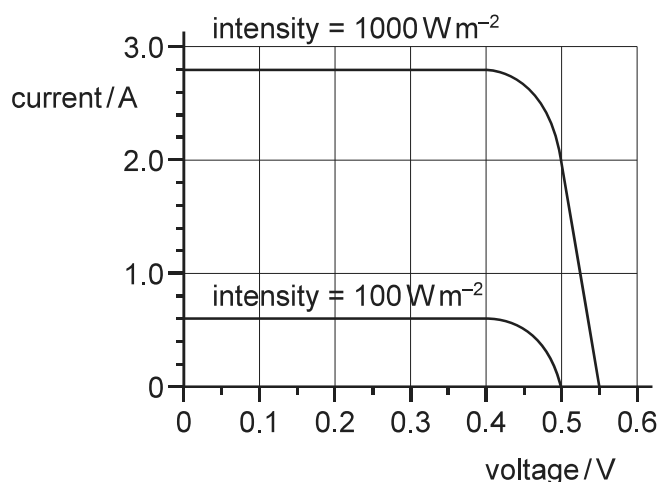
- 45 The drag force acting on a moving sphere of radius r is given by the equation $F = k v$, where F represents the drag force, v represents the speed of the sphere and k is a constant. The SI units of k are

A $\text{kg m}^{-2} \text{s}^{-1}$ B $\text{kg m}^{-2} \text{s}^{-1}$ C $\text{kg m}^{-3} \text{s}^{-1}$ D $\text{kg m}^{-4} \text{s}^{-2}$

What are the base units of the constant k ?

- A gm s^{-4} B $\text{gm}^2 \text{s}^{-1}$ C gm^3 D $\text{gm}^4 \text{s}^2$

- 46 The graph shows the variation of the current I with the voltage V for a filament bulb at two different intensities. The intensity of the light is 1000 W m^{-2} for the upper curve and 100 W m^{-2} for the lower curve. The ratio of the resistance of the bulb at the two intensities is



At the two intensities, the ratio of the resistance of the bulb is

- A 1:1 B 4:7 C 8:1 D 1:1

- 47 The unit of potential difference V is given in base units. The unit V is

- A $\text{gmA}^{-1} \text{s}^{-3}$
B $\text{m}^2 \text{A}^{-1} \text{s}^{-2}$
C $\text{gm}^2 \text{s}^{-2}$
D $\text{gm}^2 \text{A}^{-1} \text{s}^{-3}$

- 48 A signal has a frequency of $2 \times 10^6 \text{ Hz}$. The period of the signal is

- A 2 s B μs C 2 ns D ns

49 The product of pressure and volume has the same base units as 97/2/11 1 /Q2

- A energy
- B force
- C $\frac{\text{force}}{\text{area}}$
- D $\frac{\text{force}}{\text{length}}$

50 An ion is accelerated a series of electrodes in a vacuum. A graph of the kinetic energy of the ion is plotted against time 97/2/11 1 /Q3

What is represented by the area under the graph between two times?

- A the change in kinetic energy of the ion
- B the average force on the ion
- C the change in momentum of the ion
- D the change in the velocity of the ion

51 A micrometer screw gauge is used to measure the diameter of a copper wire 97/2/12 1 /Q1

The reading of the wire in position is shown in diagram 1. The wire is removed and the same micrometer is closed. The new reading is shown in diagram 2.

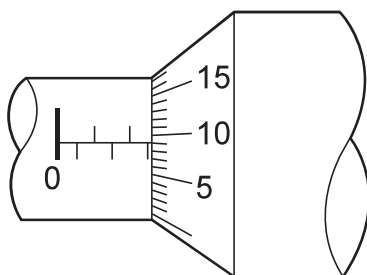


diagram 1

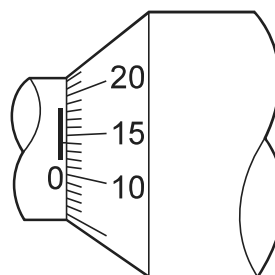


diagram 2

What is the diameter of the wire?

- A 1.9 mm
- B 2.4 mm
- C 2.9 mm
- D 2.73 mm

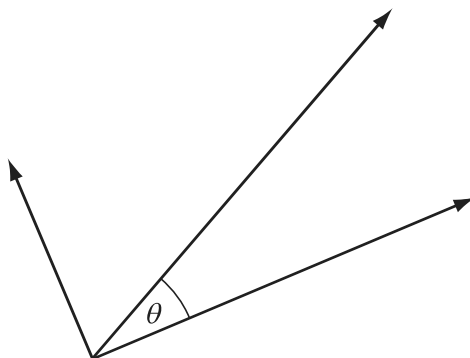
52 The unit of potential difference that is given in base units 97/2/12 1 /Q2

- A $\text{g mA}^1 \text{s}^3$
- B $\text{m}^2 \text{A}^1 \text{s}^2$
- C $\text{g m}^2 \text{s}^2$
- D $\text{g m}^2 \text{A}^1 \text{s}^3$

53 The product of pressure and volume has the same base units as 97 2 13 1 /Q1

- A energy
- B force
- C $\frac{\text{force}}{\text{area}}$
- D $\frac{\text{force}}{\text{length}}$

54 A vector quantity is resolved into two perpendicular components and the angle between the component is θ 97 2 13 1 /Q2



The angle between a component and the vector is increased from 90°

to 0° . The magnitude of the component changes as the angle θ is increased. This is a

A	increase	increase
B	increase	decrease
C	decrease	increase
D	decrease	decrease

55 Which scalar quantity can be derived from a calculation in which a potential difference is multiplied by an electric charge 97 2 11 1 /Q3

- A electric current
- B electric energy
- C electric field strength
- D electric power

56 A metal wire of radius r is rolled into a tangent of length l . As it is rolled, it experiences a drag force given by $F = k r v$, where k is a constant 97 2 11 1 /Q2

What are the base units of k ?

- A gm^2s^{-1}
- B gm^2s^{-2}
- C $\text{gm}^{-1}\text{s}^{-1}$
- D gms^{-2}

57 Which of the following quantities has its correct unit? 97/2/12 1 /Q1

	Quantity	Unit
A	current	A
B	mass	g
C	temperature	C
D	weight	

58 The frictional force on a sphere of radius r moving through a fluid is given by the formula 97/2/12 1 /Q2

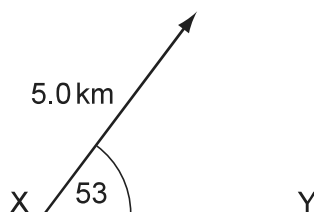
$$F = \pi a \eta v$$

where a is the radius of the sphere, η is a constant relating to the fluid and v is the velocity of the sphere.

What are the units of η ?

- A gms^{-1} B $\text{gm}^{-1}\text{s}^{-1}$ C gms^{-3} D gm^3s^{-3}

59 What is the component of this displacement vector in the direction 97/2/12 1 /Q3



- A 3 m B 4 m C 5 m D 6 m

60 Which physical quantity has the same units as the result from a calculation in which a potential difference is multiplied by an electric charge? 97/2/13 1 /Q1

- A electric current
B electric energy
C electric field strength
D electric power

61 Which definition is correct and uses only quantities rather than units? 97/2/11 11/Q2

- A Density is mass per cubic metre
B Potential difference is energy per unit current
C Pressure is force per unit area
D Speed is distance travelled per second

- 62 Decima su muti es an muti es o units are in icate using a re i to t e unit or e am e t e re i mi i m re resents 10^{-3}

ic ro gi es t e su muti es or muti es re resente

ico an giga

97/2/11

11/Q1

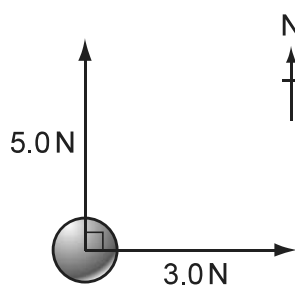
	ico	giga
A	10^9	10^9
B	10^9	10^{12}
C	10^{12}	10^9
D	10^{12}	10^{12}

- 63 A orce o us es a a ue nort an anot er orce o 3

us es it ue east

97/2/11

11/Q3



at is t e magnitu e o t e net orce acting on t e a

A 2.8

B 4

C 8

D 8

- 64 tress as t e same ase units as 97/2/12 11/Q1

A $\frac{\text{orce}}{\text{mass}}$

B $\frac{\text{orce}}{\text{engt}}$

C $\frac{\text{orce}}{\text{area}}$

D energy

- 65 o c ec ca cuations t e units are ut into t e o o ing e uations toget er it t e num ers

ic e uation must e incorrect 97/2/12 11/Q2

A orce 3 m

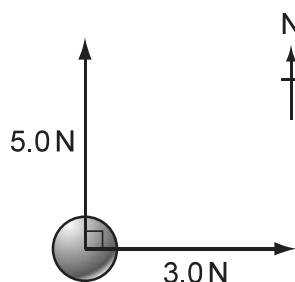
B o er 2 s

C time $\text{m}^3 \text{ms}^{-1}$

D e ocit $4 \text{ms}^2 \text{ s}$

66. In making reasonable estimates of physical quantities, which statement is not correct?
 97/2/12 11/Q3
- A. The frequency of sound can be 0.1 Hz or 10 Hz.
 B. The wavelength of light can be 0.1 nm or 10 nm.
 C. The young moon can be 0.1 Hz or 10 Hz.
 D. Beta radiation is associated with one unit of negative charge.

67. A force of 5.0 N acts due north and another force of 3.0 N acts due east.
 97/2/13 11/Q1



What is the magnitude of the net force acting on the particle?

- A. 2.8 B. 4 C. 8 D. 8
68. Decimamultiplier and multiplier units are indicated using a prefix to the unit or the name of the multiplier. Which represents 10^{-3} ?

Which of the following multiplier or multiplier represents micro and giga? 97/2/13 11/Q2

	micro	giga
A	10^{-9}	10^9
B	10^{-9}	10^{12}
C	10^{12}	10^9
D	10^{12}	10^{12}

69. Which definition is correct and uses SI units rather than units? 97/2/13 11/Q3
- A. Density is mass per cubic metre.
 B. Potential difference is energy per unit current.
 C. Pressure is force per unit area.
 D. Speed is distance travelled per second.

70. An athlete of mass 80 kg completes a 100 m race. 97/2/11 11/Q2

What is the best estimate of his mean kinetic energy during the race?

- A. 4×10^2 B. 4×10^3 C. 4×10^4 D. 4×10^5

71 Which statement using the SI base unit metre (m) is not correct 97/2/11 11/Q1

- A $1 \text{ m} = 10^{12} \text{ m}$
- B $1 \text{ nm} = 10^{-9} \text{ m}$
- C $1 \text{ m} = 10^3 \text{ m}$
- D $1 \text{ m} = 10^{12} \text{ m}$

72 Which group of quantities contains only scalars 97/2/11 11/Q3

- A acceleration, displacement, speed
- B acceleration, electric field strength
- C displacement, force, velocity
- D electric field strength, force

73 A car is travelling on a slope of inclination θ metres a distance in time t . The equation relating these quantities is

$$\left(3 \frac{a^2}{g} \right) = t^2 \sin \theta$$

where a is the internal radius of the tyre and g are constants 97/2/11 11/Q4

Which line gives the correct units for a and g

A	m^2	$\text{m}^2 \text{s}^{-2}$
B	m^2	ms^{-2}
C	m^2	$\text{m}^3 \text{s}^{-2}$
D	m^3	ms^{-2}

74 Which quantity can be measured in electron volts (eV) 97/2/12 11/Q1

- A electric charge
- B electric potential
- C energy
- D power

75 What is the ratio $\frac{10^3}{10^3}$ 97/2/12 11/Q2

- A 10^{-9}
- B 1
- C 1
- D 10^3

- 76 Which of the following physical quantities can be either positive or negative?
 A Displacement of a particle along a straight line
 B Temperature on the Celsius scale
 C Electric charge
 D Readings on a digital thermometer
 Which of these quantities are vectors?
 A s θ B s on C θ on D s on
- 77 Which group of quantities contains only vectors?
 A Acceleration, displacement, speed
 B Acceleration, force, electric field strength
 C Displacement, force, velocity
 D Power, electric field strength, force
- 78 Which statement using prefixes of the base unit metre (m) is not correct?
 A $1 \text{ m} = 10^{12} \text{ m}$
 B $1 \text{ nm} = 10^{-9} \text{ m}$
 C $1 \text{ m} = 10^3 \text{ m}$
 D $1 \text{ m} = 10^{12} \text{ m}$
- 79 When a force moves its point of application through a displacement in the direction of the force, the work done by the force is given by

$$W = F s$$
 Which of the following statements are correct?
 A One scalar quantity and two vector quantities
 B One vector quantity and two scalar quantities
 C Three scalar quantities
 D Three vector quantities
- 80 What is a reasonable estimate of the average kinetic energy of an athlete during a 100 m race that takes 10 s?
 A 4 J B 40 J C 400 J D 4000 J

- 81 What is a possible unit for the product of the potential difference across a resistor and the current through the same resistor

97/2/11 12/Q2

- A newton per second s^{-1}
 B newton second s
 C newton metre m
 D newton metre per second ms^{-1}

- 82 What is the unit of acceleration in terms of base units

97/2/12 12/Q1

- A s^{-1} B $\text{m}^2 \text{gs}^{-1}$ C $\text{m}^2 \text{gs}^{-3}$ D ms^{-1}

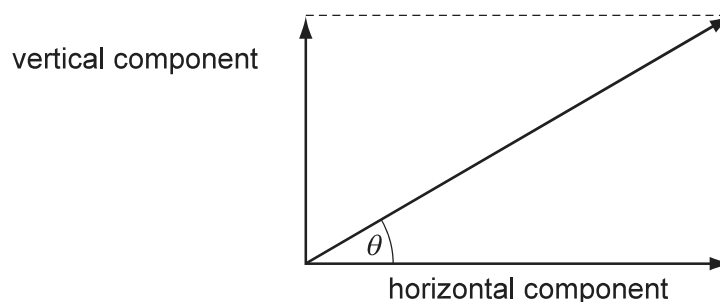
- 83 Which quantity is the magnitude of a reasonable estimate

97/2/12 12/Q2

- A frequency of a radio wave
 B mass of an atom g
 C the Young's modulus of a metal Pa
 D the length of green light nm

- 84 A vector has magnitude and direction. Which of the following is not a vector diagram

97/2/12 12/Q3



Which of the following correctly describes the components of the vector

	vertical component	horizontal component
A	$\sin \theta$	$\cos \theta$
B	$\cos \theta$	$\sin \theta$
C	$\sin \theta$	$\sin \theta$
D	$\sin \theta$	$\cos \theta$

- 85 What is a reasonable estimate of the average kinetic energy of an atom at room temperature

97/2/13 12/Q1

- A $4 \times 10^{-21} \text{ J}$ B $4 \times 10^{-20} \text{ J}$ C $4 \times 10^{-19} \text{ J}$ D $4 \times 10^{-18} \text{ J}$

86. When a force moves its point of application through a displacement in the direction of the force the work done by the force is given by

97 2 13 12/Q2

s

Of the following quantities, which of the following quantities does this equation contain?

- A. one scalar quantity and two vector quantities
- B. one vector quantity and two scalar quantities
- C. three scalar quantities
- D. three vector quantities

87. What is a possible unit for the product of the potential difference across a resistor and the current through the same resistor?

97 2 13 12/Q3

- A. newton per second s^{-1}
- B. newton second s
- C. newton metre m
- D. newton metre per second ms^{-1}

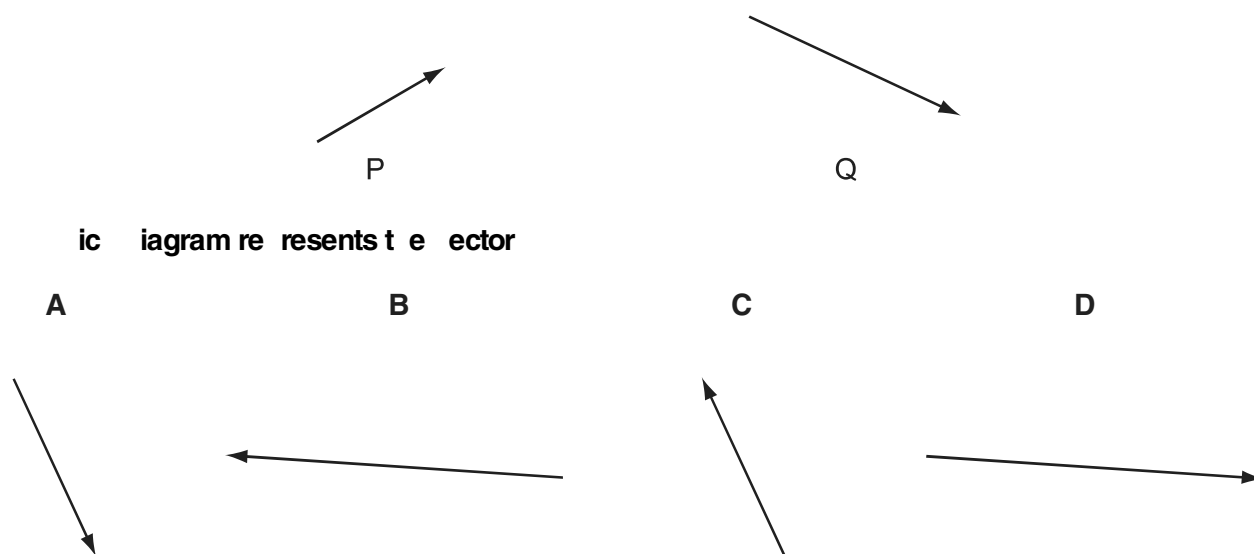
88. What is the unit of weight in terms of base units?

97 2 11 12/Q1

- A. gms^{-1}
- B. gms^{-2}
- C. kgms^{-2}
- D. m^{-1}

89. Vectors and scalars are related to each other by

97 2 11 12/Q2



Which diagram represents the vector

A

B

C

D

90. What is the approximate temperature of a red-hot ring on an electric cooker?

97 2 11 12/Q3

- A. 1 °C
- B. 2 °C
- C. 4 °C
- D. 8 °C

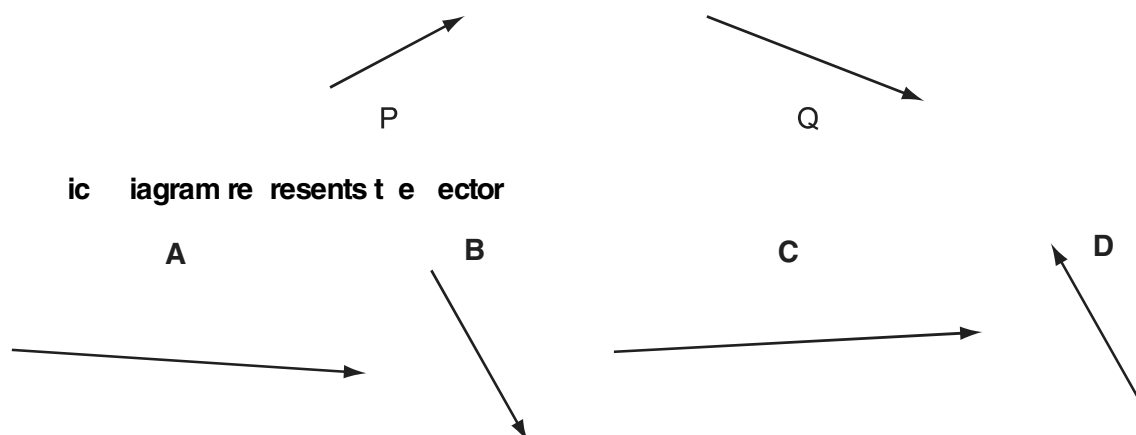
91 Which quantities have the same base units as momentum

97 2 12 12/Q1

- A density energy
- B density volume velocity
- C pressure area
- D weight area

92 Vectors $\vec{a}$ and $\vec{b}$ are related to scalar

97 2 12 12/Q2



Which diagram represents the vector

93 What is the approximate kinetic energy of an 80 kg athlete when running at maximum speed during a 100 m race

97 2 12 12/Q3

- A 4 J
- B 4 kJ
- C 4 MJ
- D 4 GJ

94 Which quantities can be classified as vectors or as scalars

97 2 12 12/Q4

Which pair of quantities are both vectors

- A kinetic energy and elastic force
- B momentum and time
- C velocity and electric field strength
- D weight and temperature

95 Which list contains only scalar quantities

97 2 11 12/Q4

- A area length displacement
- B kinetic energy speed power
- C potential energy momentum time
- D velocity distance temperature

96 Which units of a physical quantities can be expressed in terms of base units

97 2 13

12/Q1

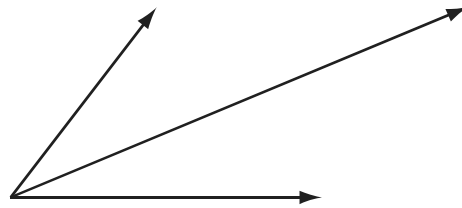
Which pair contains quantities with the same base units

- A Force and momentum
- B Pressure and Young's modulus
- C Power and kinetic energy
- D Mass and weight

97 Which physical quantities are added to give a scalar quantity

97 2 13

12/Q2



Which quantity could be represented by an

- A Kinetic energy
- B Power
- C Speed
- D Acceleration

98 A 1 kg object is 2 m above the ground. The object is released and falls. What is the kinetic energy of the object just before it hits the ground?

97 2 13

12/Q3

What is a sensible estimate for the initial kinetic energy content of the

- A 1 J
- B 1 kJ
- C 1 MJ
- D 1 GJ

99 Which of these quantities has the same unit

97 2 13

12/Q4

Which quantity has a different unit

- A $\frac{\text{energy}}{\text{distance}}$
- B Force
- C Power
- D Rate of change of momentum

100 Which pair of quantities contains one vector and one scalar quantity?

97/2/11 13/Q1

- A Displacement force
- B Kinetic energy power
- C Acceleration momentum
- D Velocity distance

101 The property of a material is used to describe the behaviour of sound waves in the material. This is the speed of the sound wave in the material. The speed of the sound wave in the material is given by the ratio of the wavelength λ to the period T . The unit of the speed of the sound wave in the material is m s^{-1} . The unit of the wavelength λ is m . The unit of the period T is s . The unit of the speed of the sound wave in the material is m s^{-1} .

97/2/11 13/Q2

$\frac{\lambda}{T}$

What are the base units of

- A gm^2s^3
- B gm^3s^{-1}
- C gm^4s^{-1}
- D gm^2s^{-2}

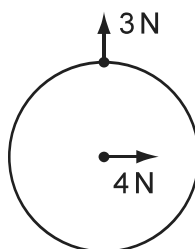
102 Which pair includes a vector quantity and a scalar quantity?

97/2/12 13/Q1

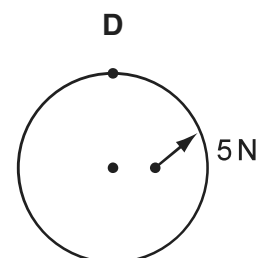
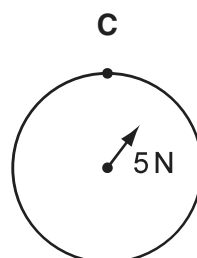
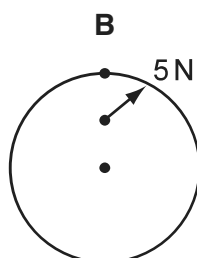
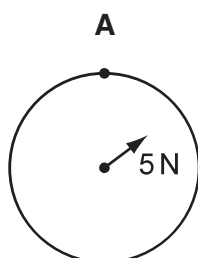
- A Displacement acceleration
- B Force kinetic energy
- C Power speed
- D Work potential energy

103 Two forces act on a circular disc as shown.

97/2/12 13/Q3



Which diagram shows the line of action of the resultant force?



104 The unit of resistance in terms of base units is given by

97 2 12 13/Q2

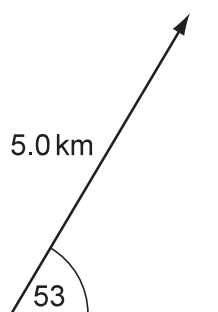
$$\text{g}^3 \text{m}^2 \text{s}^3$$

Which base units are correct?

A	ampere	metre	second
B	metre	ampere	second
C	metre	second	ampere
D	second	ampere	metre

105 The diagram shows a displacement vector

97 2 13 13/Q1



What is the vertical component of this displacement vector?

- A 3 m B 4 m C 5 m D 6 m

106 What is the unit of power in base units?

97 2 13 13/Q2

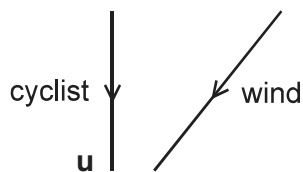
- A gm^2s^3 B gms^3 C gms^2 D gm^2s^1

107 Which statement is incorrect about a factor of 10 or more?

97 2 13 13/Q3

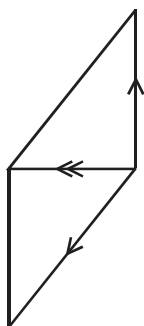
- A Atmospheric pressure is about 10^5 Pa
 B Light takes 10^8 s to reach us from the sun
 C The frequency of ultraviolet light is $3 \times 10^{12} \text{ Hz}$
 D The mass of a man is about $2 \times 10^9 \text{ kg}$

- 108 A cyclist is travelling due south at a speed of 10 m/s . The wind is blowing from the north-east at a speed of 10 m/s .
97/2/13 13/Q4

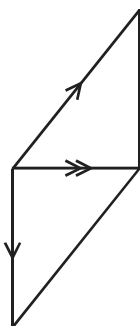


The wind is a vector relative to the cyclist. Use vector diagrams to state the magnitude and direction of the cyclist's velocity.

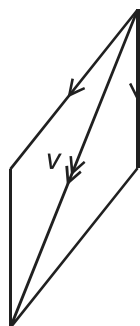
A



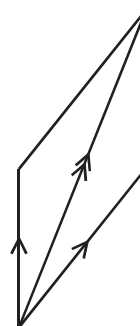
B



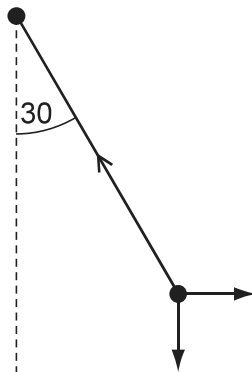
C



D



- 109 A penumbra is stationary. A horizontal force of 10 N acts on the penumbra. The forces acting on the penumbra are 10 N and 10 N .
97/2/11 13/Q2



The tension in the string of the penumbra is 10 N . The weight of the penumbra is 10 N .

Which statement is correct?

- A $\cos 30^\circ$
B $\sin 30^\circ$
C $\cos 60^\circ$
D $\sin 60^\circ$

110 Which of the following physical quantities has the correct unit?

97/2/11 13/Q1

	Physical quantity	Unit
A	Charge	Coulomb
B	Current	Ampere
C	Potential difference	Volt
D	Temperature	Degree Celsius

111 The drag coefficient C_D is a number with no units. It is used to compare the drag on different cars at different speeds. It is given by the equation

97/2/11 13/Q3

$$C_D = \frac{2}{\rho v^2 A}$$

where F_D is the drag force on the car, ρ is the density of the air, A is the cross-sectional area of the car and v is the speed of the car.

What is the value of n ?

- A 1 B 2 C 3 D 4

112 Two forces of equal magnitude are represented by two co-planar vectors. One is directed east and the other is directed north. What is the direction of the resultant of these two forces?

97/2/13 13/Q3

What is the direction of the resultant of these two forces?

- A towards the north-east
B towards the north-west
C towards the south-east
D towards the south-west

113 The spring constant of a coil spring is given by the equation

97/2/13 13/Q4

$$k = \frac{r^4}{4n^3}$$

where r is the radius of the wire, n is the number of turns of the wire and k is the spring constant. The unit of k is N m^{-1} . What is the unit of r ?

What is the unit of r ?

- A m^2 B m^{-1} C m D m^2

114 Which estimate is realistic

97 2 13 13/Q1

- A The kinetic energy of a bus travelling on an express road is 3
- B The power of a domestic light is 3
- C The temperature of a hot oven is 3
- D The volume of air in a car tyre is 3 m^3

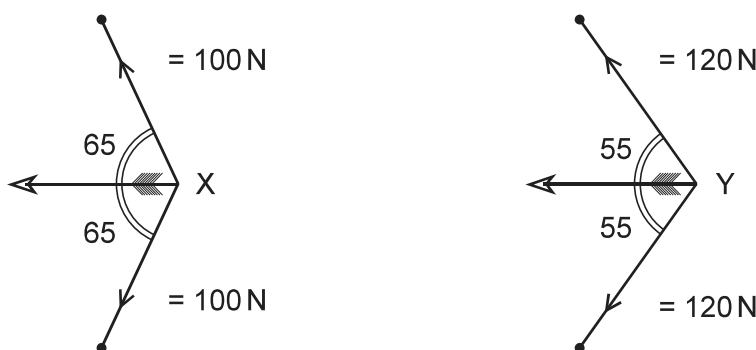
115 Which unit is equivalent to the coulomb

97 2 13 13/Q2

- A ampere per second
- B coulomb per second
- C watt per ampere
- D watt per ohm

116 An arc is drawn by a string attached to a point on a horizontal surface. The string is attached to a point on the surface and the other end is attached to a point on the surface. The string is attached to a point on the surface and the other end is attached to a point on the surface.

97 2 11 13/Q14



The resultant force on the arrow is greater than the force released from position at the increase in force

- A 1
- B 27
- C 4
- D 3

117 The maximum theoretical power of a turbine is given by the equation

97 2 12 14/Q1

$$\rho A v^3$$

where ρ is the density of air, A is the area swept by the turbine blades, v is the speed of the air and k is a constant with no units

What is the value of k

- A 1
- B 2
- C 3
- D 4

- 118 Which pair of units contains one derived unit and one base unit
 A ampere coulomb
 B kilogramme in
 C metre second
 D newton pascal

- 119 What is the value of 2 micro ohms
 A 2×10^{-6} B 2×10^{-3} C 2×10^{-9} D 2×10^{-12}

- 120 The relationship between the change in pressure Δp and the density ρ of a fluid is given by the equation

$$\left(\frac{\Delta p}{\rho} \right)^n$$

where k is a constant that has no units

What is the value of n

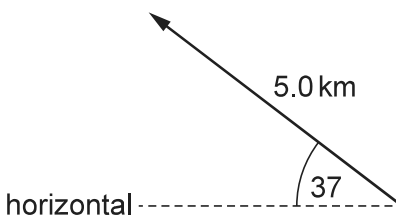
- A $\frac{1}{2}$ B 1 C $\frac{3}{2}$ D 2
- 121 What is the unit of resistance expressed in base units
 A $\text{gm}^2\text{s}^{-2}\text{A}^{-1}$
 B $\text{gm}^2\text{s}^{-3}\text{A}^{-2}$
 C $\text{gms}^{-2}\text{A}^{-1}$
 D $\text{gms}^{-3}\text{A}^{-1}$

- 122 Which quantity can be measured in electron volts
 A electric charge
 B electric potential
 C energy
 D power

- 123 The unit of specific heat capacity is $\text{J kg}^{-1} \text{K}^{-1}$
 What is its value in terms of base units
 A $\text{g}^{-1}\text{m}^2\text{s}^{-2}\text{K}^{-1}$ B $\text{ms}^{-1}\text{K}^{-1}$ C $\text{ms}^{-2}\text{K}^{-1}$ D $\text{m}^2\text{s}^{-2}\text{K}^{-1}$

124 What is the vertical component of this displacement vector

97 2 13 14/Q3



- A 3 m B 38 m C 4 m D m

125 The rates are a function of the distance moved. The expression for the rate of change of the distance moved with time is given by the expression

97 2 13 14/Q1

2

where k is a constant

What is the unit of k in base units

- A $m^1 s^2$ B ms^2 C $m^2 s^2$ D $m^1 s$

126 Which statement contains one vector quantity and two scalar quantities

97 2 13 14/Q2

- A displacement, weight, speed
B force, acceleration, time
C momentum, mass, speed
D force, density, energy

127 What is the equivalent to the unit of electric field strength

97 2 11 14/Q2

- A Cm^{-1} B sA^{-1} C $gms^{-3}A^{-1}$ D $gm^3s^{-3}A^{-1}$

128 Which statement includes a correct unit

97 2 13 1 /Q1

- A energy 78 s
B force 38 s
C momentum 2 s
D torque 47 s

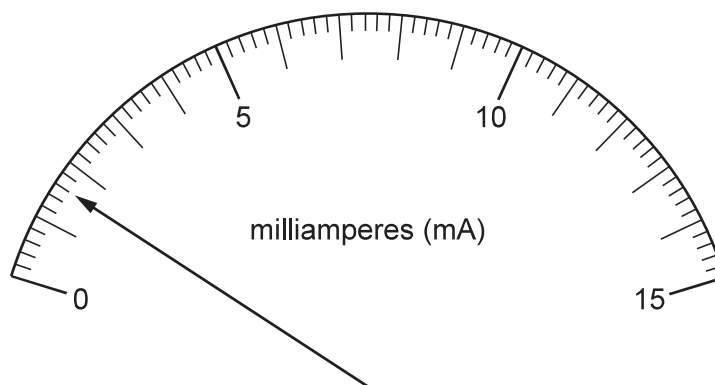
129 What is the value of k in base units

97 2 13 1 /Q2

- A gms^{-1} B gm^2s^{-1} C gms^{-2} D gm^2s^{-2}

130 The diagram shows the reading on an analogue ammeter

97 2 11 14/Q3



The digital ammeter reading is the same as the reading on the analogue ammeter

	is a units	is a reading
A	A	1
B	A	1
C	mA	1
D	A	1

131 Which definition is correct and uses only quantities rather than units

97 2 12 1 /Q1

- A Density is mass per cubic metre
- B Potential difference is energy per unit current
- C Pressure is force per unit area
- D Speed is distance travelled per second

132 The average kinetic energy of a gas molecule is given by the equation

97 2 12 1 /Q2

$$\frac{3}{2}$$

where k is the Boltzmann constant

What are the base units of k

- A $\text{g}^1 \text{m}^1 \text{s}^2$
- B $\text{g}^1 \text{m}^2 \text{s}^2$
- C $\text{gms}^{-2} \text{K}^{-1}$
- D $\text{gm}^2 \text{s}^{-2} \text{K}^{-1}$

133 Which is an SI base unit

97 2 11 1 /Q1

- A current
- B gram
- C newton
- D joule

134 Which pair contains one vector and one scalar quantity

97 2 11 1 /Q2

- A displacement acceleration
- B force kinetic energy
- C momentum velocity
- D power speed

135 A body moving with a constant velocity v comes to rest in time t . The distance travelled by the body in coming to rest is given by the expression

97 2 11 1 /Q3

2

where a is a constant

The distance s is measured in metres and time t is measured in metres per second. The constant a has a value of

What is the value of the constant a when the distance s is measured in metres and time t is measured in milliseconds?

- A 772 ms^{-1}
- B 278 ms^{-1}
- C 3 ms^{-1}
- D 13 ms^{-1}