Physical Quantities, Units and Measurements

Question Paper

Level	O Level
Subject	Physics
Exam Board	Cambridge International Examinations
Unit	General Physics
Topic	Physical Quantities, Units and Measurements
Booklet	Question Paper

Time Allowed: **70 minutes**

Score: **/58**

Percentage: **/100**

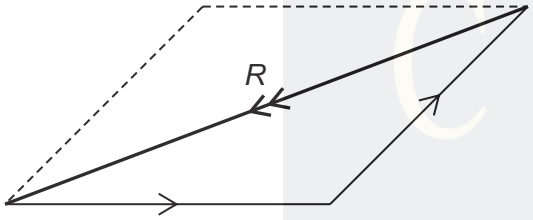
Grade Boundaries:

CHEMISTRY ONLINE TUITION

1 The diagram shows arrows representing two vector quantities.

Which diagram shows the resultant *R* of these two vectors?

A



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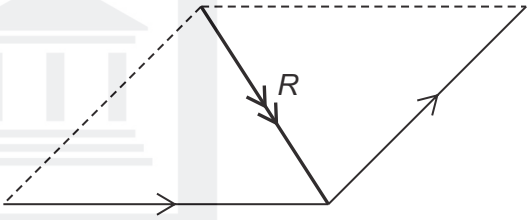

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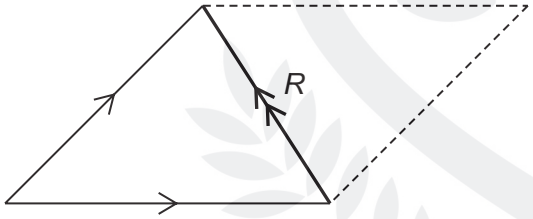

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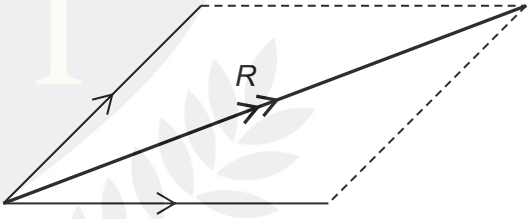

2 Which set of quantities are all vectors?

A acceleration, displacement, velocity

B chemical energy, mass, power

C extension, force, gravitational potential energy

D weight, kinetic energy, work

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3 A student determines the circumference of a golf ball.

Which instrument gives a reading that is the circumference of the golf ball?

A calipers

B micrometer

C rule

D tape

4 Which quantity is a vector?

A energy

B force

C speed

D time

5 Is mass a scalar or a vector, and is acceleration a scalar or a vector?

	mass	acceleration
A	scalar	scalar
B	scalar	vector
C	vector	scalar
D	vector	vector

6 The diameter and the length of a thin wire, approximately 50 cm in length, are measured as precisely as possible.

What are the best instruments to use?

	diameter	length
A	micrometer	rule
B	micrometer	vernier calipers
C	rule	tape
D	vernier calipers	rule

7 Newton's third law involves two quantities which are equal in size and opposite in direction.

What is the unit for these two quantities?

A J

B m/s^2

C N

D W

8 Which quantity is a scalar?

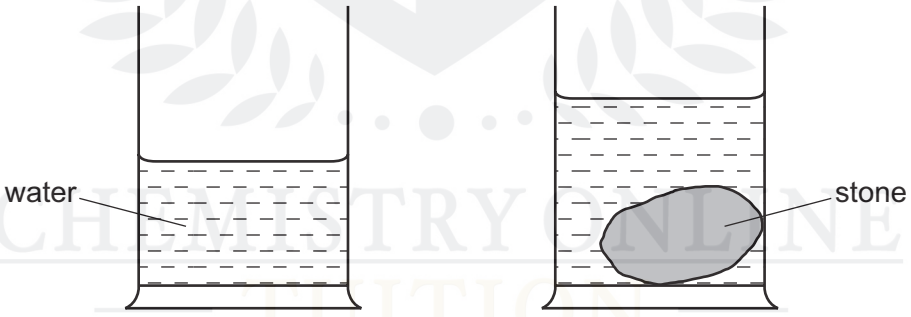
A acceleration

B force

C temperature

D velocity

9 During an experiment to find the density of a stone, the stone is lowered into a measuring cylinder partly filled with water.



Which statement is correct?

A The difference between the readings gives the density of the stone.

B The difference between the readings gives the volume of the stone.

C The final reading gives the density of the stone.

D The final reading gives the volume of the stone.

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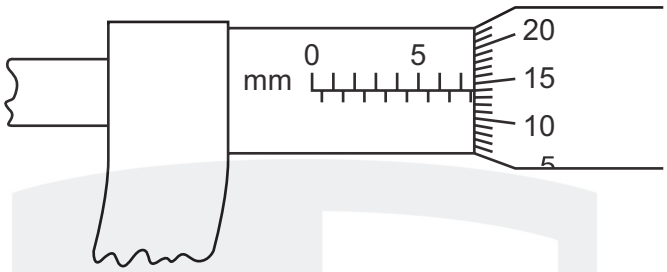
10 The diagram shows a micrometer scale.



Which reading is shown?

A 5.64 mm **B** 7.14 mm **C** 7.16 mm **D** 7.64 mm

11 Which is a scalar quantity?

A mass

B force

C velocity

D weight

12 A workman measures, as **accurately** as possible, the length and internal diameter of a straight copper pipe.

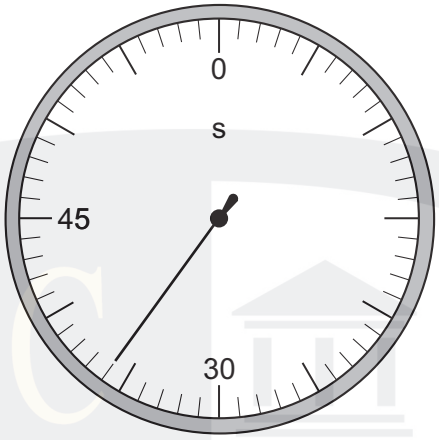
The length is approximately 600 cm and the internal diameter is approximately 2 cm.

What is the best combination of instruments for the workman to use?

	internal diameter	length
A	ruler	ruler
B	ruler	tape
C	vernier calipers	ruler
D	vernier calipers	tape

CHEMISTRY ONLINE TUITION

13 The diagram shows a stopwatch.



What is the reading on the stopwatch?

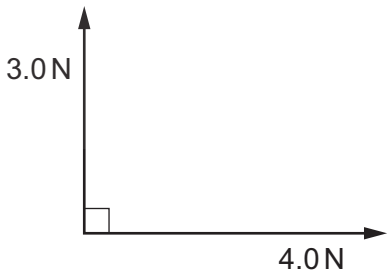
A 30.6 s **B** 33.0 s **C** 36.0 s **D** 36.6 s

14 Each row contains a vector and a scalar.

In which row is the size of the vector equal to the size of the scalar?

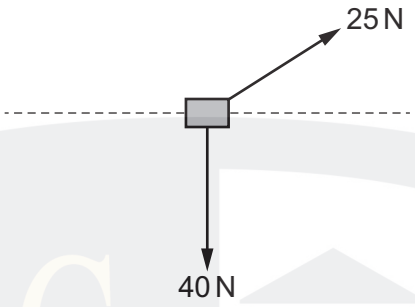
	vector	
A	displacement of a car	speed of the car
B	velocity of a car	distance travelled by the car
C	velocity of a car	speed of the car
D	weight of a car	mass of the car

15 What is the size of the resultant of the two forces shown in the diagram?

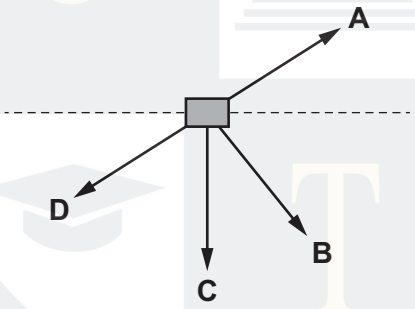


A 1.0 N **B** 3.5 N **C** 5.0 N **D** 7.0 N

16 Forces of 25 N and 40 N act on an object in the directions shown.



Which arrow shows the direction of the resultant force on the object?



17 Which device can be used to measure the thickness of a single sheet of paper?

A a metre rule

B a micrometer

C a plastic ruler

D a measuring tape

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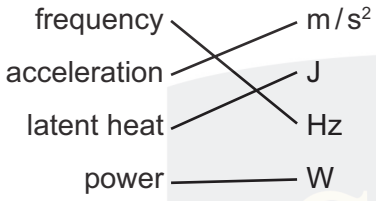
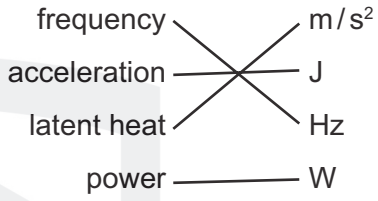
18 In a test, four students linked the quantities on the left with their units on the right.

Which student matched them all correctly?

A



B



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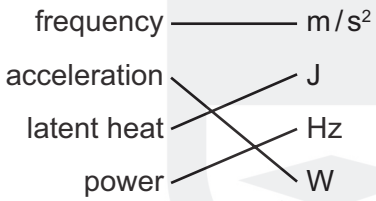
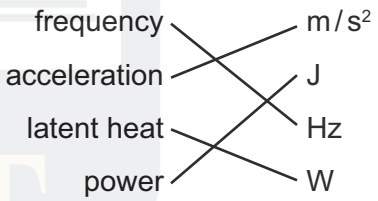


D



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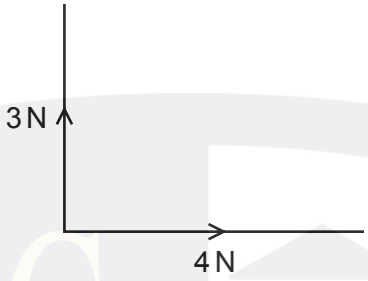
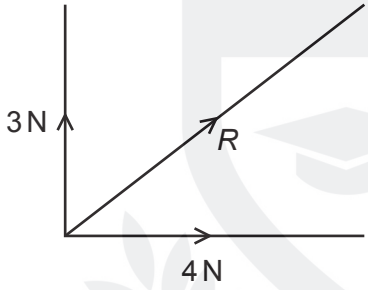
19 Forces of 3 N and 4 N act as shown in the diagram.



Which diagram shows the resultant *R* of these two forces?

A



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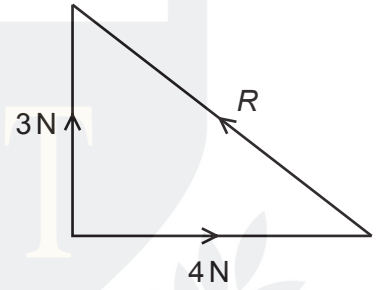

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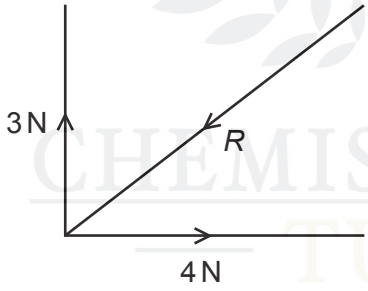

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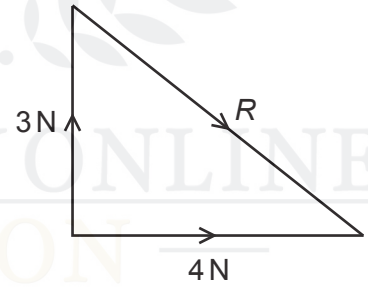

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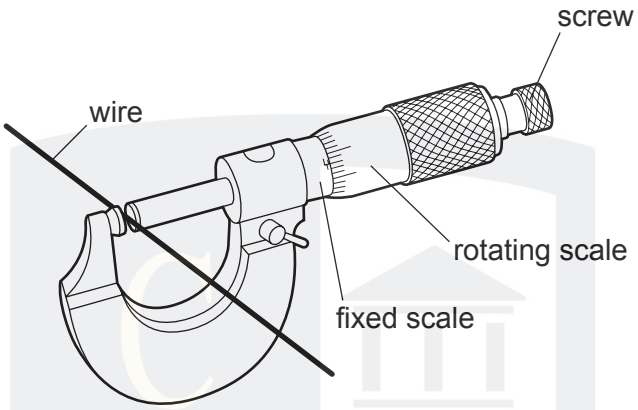
20 A micrometer is used to measure the diameter of a uniform wire.



What is done to obtain an accurate answer?

A Find the reading and add or subtract the zero error.

B Make the micrometer horizontal.

C Subtract the fixed scale reading from the rotating scale reading.

D Subtract the rotating scale reading from the fixed scale reading.

21 Before marking the finishing line on a running track, a groundsman measures out its 100 m length.

Which instrument is the most appropriate for this purpose?

A measuring tape

B metre rule

C 30 cm ruler

D micrometer

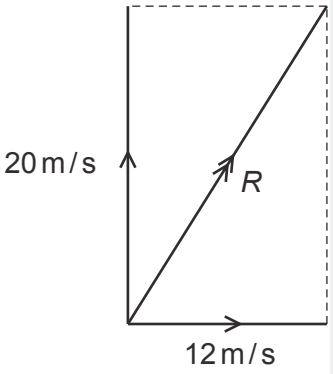
CHEMISTRY ONLINE TUITION

22 When there is no wind, the engines of an airship push it due north at 20 m / s.

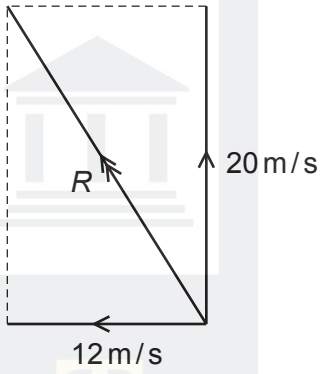
The wind is blowing from the west at 12 m / s.

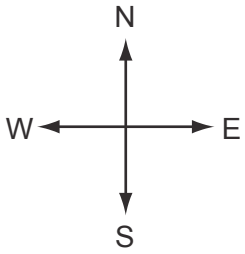
Which vector diagram correctly shows how the resultant velocity *R* of the airship is obtained?

A



B





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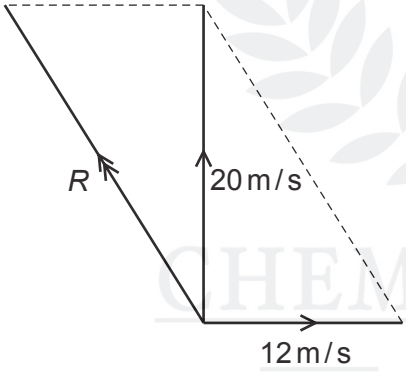

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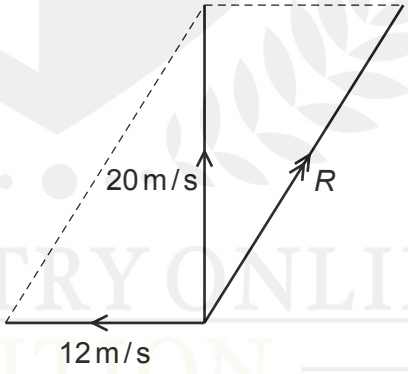
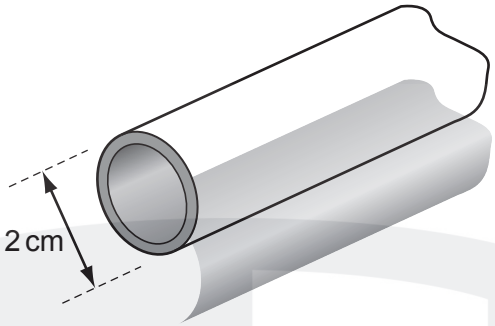


CHEMISTRY ONLINE TUITION

23 A length of copper pipe, of uniform cross-section and several metres long, carries water to a tap.



Measurements are taken to determine accurately the volume of copper in the pipe.

Which instruments are used?

A calipers and micrometer

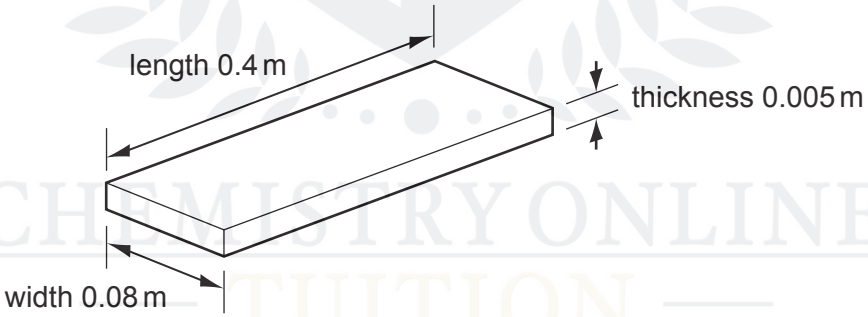
B micrometer and rule

C rule and tape

D tape and calipers

24 A manufacturer measures accurately the dimensions of a wooden floor tile.

The approximate dimensions of the tile are shown.



Which instruments are used to measure accurately each of these dimensions?

	length	thi	width
A	metre rule	micrometer	vernier calipers
B	metre rule	vernier calipers	micrometer
C	micrometer	metre rule	vernier calipers
D	vernier calipers	micrometer	metre rule

CHEMISTRY ONLINE TUITION

25 Which pair of quantities includes one scalar and one vector?

A mass time

B temperature time

C temperature velocity

D velocity weight

26 A reel of copper wire is labelled 'length 30 m' and 'diameter 2 mm'. A student calculates the volume of the copper wire.

Which instruments does he use to measure accurately the length and the diameter of the wire?

	length	diameter
A	rule	calipers
B	rule	micrometer
C	tape	calipers
D	tape	micrometer

27 Which row correctly shows examples of a vector quantity and a scalar quantity?

	vector	scalar
A	area	force
B	mass	density
C	velocity	acceleration
D	weight	volume

28 Vernier calipers read to one tenth of a millimetre.

Which reading is given to this precision?

A 3.3 cm **B** 3.31 cm **C** 3.310 cm **D** 3.312 cm

29 Velocity is given by the change in displacement divided by the change in time.

How many vector quantities appear in this statement?

A 0 **B** 1 **C** 2 **D** 3

30 The level of water in a measuring cylinder is 75 cm^3. A stone of volume 20 cm^3 is lowered into the water.

What is the new reading of the water level?

A 20 cm^3 **B** 55 cm^3 **C** 75 cm^3 **D** 95 cm^3

31 A plumber measures, as **accurately** as possible, the length and internal diameter of a straight copper pipe.

The length is approximately 80 cm and the internal diameter is approximately 2 cm.

What is the best combination of instruments for the plumber to use?

	internal diameter	length
A	rule	rule
B	rule	tape
C	vernier calipers	rule
D	vernier calipers	tape

32 What is the correct unit for the quantity shown?

	quantity	unit
A	electromotive force (e.m.f.)	N
B	latent heat	J
C	pressure	kg/m^3
D	weight	kg

CHEMISTRY ONLINE TUITION

33 The diameter and the length of a thin wire, approximately 1 m in length, are measured as accurately as possible.

What are the best instruments to use?

	diameter	length
A	micrometer	rule
B	micrometer	vernier calipers
C	rule	tape
D	vernier calipers	rule

34 A quantity is quoted as having a value of 6.2 ms.

In what units is it measured?

A metres

B metres per second

C microseconds

D milliseconds

35 The following statements are about motion.

1 A plane flies due East for 600 km.

2 A runner's average speed in a race around a track is 5 m / s.

3 A snail crawls at 3 mm / s in a straight line towards a lettuce.

4 A tourist travels 500 km on a journey.

Which statements describe vector quantities?

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 and 4

36 Power is measured in watts.

What is the correct symbol for millions of watts?

A mw **B** mW **C** Mw **D** MW

37 Which list contains only scalar quantities?

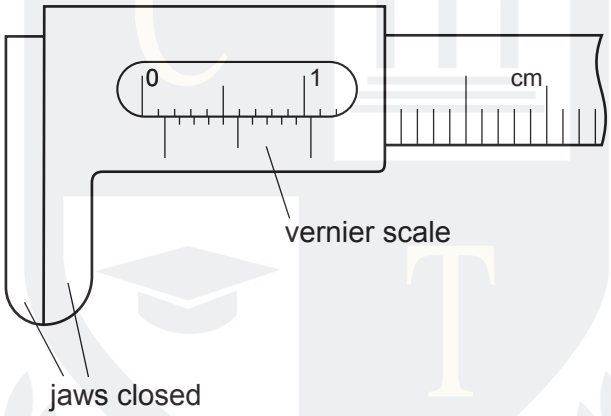
A acceleration, displacement, velocity

B distance, force, speed

C force, length, time

D length, mass, speed

38 Vernier calipers are shown with the jaws closed.



What is the zero error?

A 0.04 cm **B** 0.05 cm **C** 0.14 cm **D** 0.15 cm

39 Which instrument is most easily used to measure the internal diameter of a pipe?

A manometer

B measuring cylinder

C micrometer

D vernier calipers

CHEMISTRY ONLINE TUITION

40 Which statement about scalars and vectors is correct?

A A scalar has direction but no size.

B A scalar has size but no direction.

C A vector has direction but no size.

D A vector has size but no direction.

41 Vernier calipers read to one tenth of a millimetre.

Which reading shows this precision?

A 3.3 cm **B** 3.31 cm **C** 3.310 cm **D** 3.312 cm

42 Which list contains only scalar quantities?

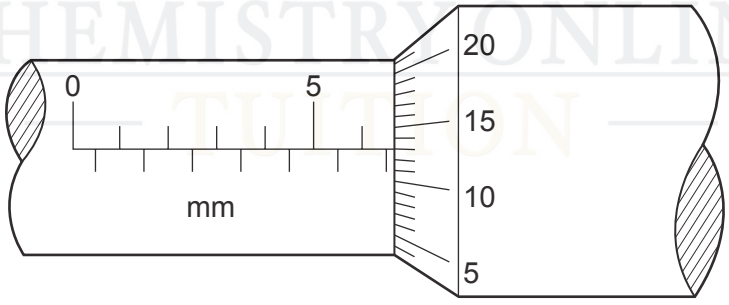
A acceleration, displacement, mass

B acceleration, distance, speed

C displacement, mass, velocity

D distance, mass, speed

43 What is the reading on this micrometer?

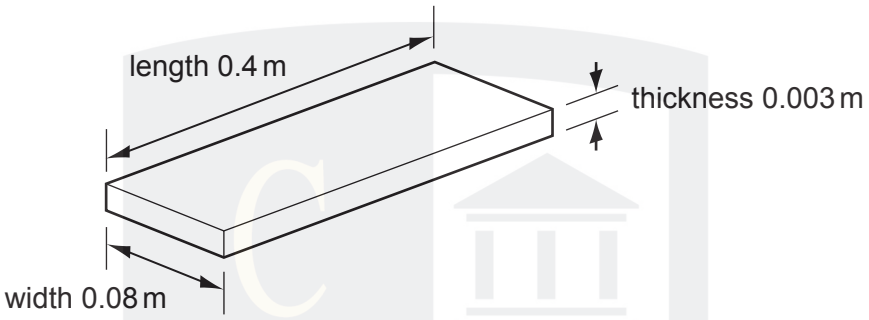


A 5.43 mm **B** 6.63 mm **C** 7.30 mm **D** 8.13 mm

CHEMISTRY ONLINE TUITION

44 A manufacturer needs to measure accurately the dimensions of a wooden floor tile.

The approximate dimensions of the tile are shown.

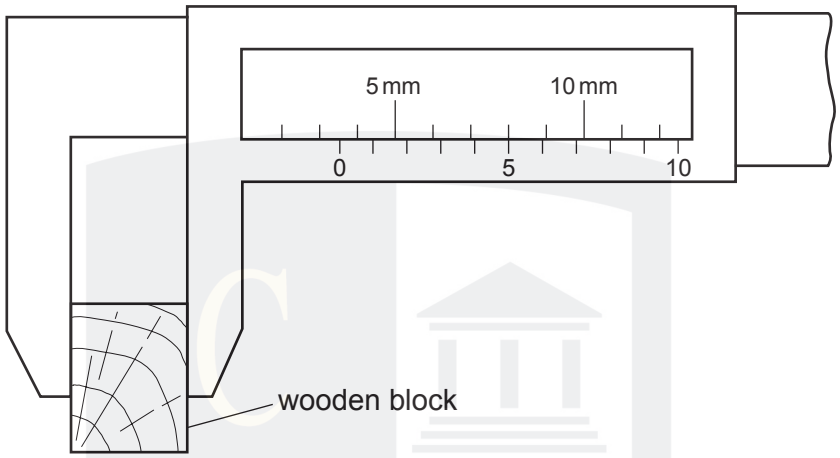


Which instruments measure each of these dimensions accurately?

	length	thi	width
A	metre rule	micrometer	vernier calipers
B	metre rule	vernier calipers	micrometer
C	micrometer	metre rule	vernier calipers
D	vernier calipers	micrometer	metre rule

CHEMISTRY ONLINE
TUITION

45 The width of a wooden block is measured using vernier calipers.



What is the width of the block?

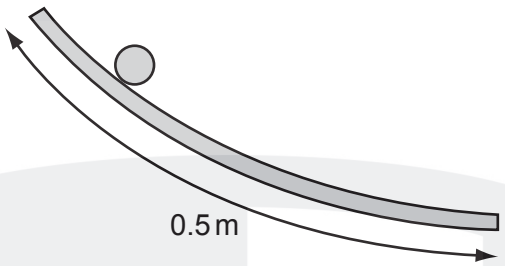
A 3.5 mm **B** 5.3 mm **C** 8.0 mm **D** 8.5 mm

46 Which of the following correctly lists one scalar and one vector quantity?

	scalar quantity	vector quantity
A	displacement	work
B	energy	force
C	force	acceleration
D	velocity	mass

CHEMISTRY ONLINE TUITION

47 In an experiment, a ball is rolled down a curved track that is about half a metre long.



Which measuring device should be used to measure the length accurately?

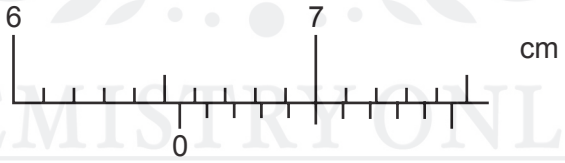
A metre rule

B micrometer

C tape measure

D vernier calipers

48 The diagram shows a vernier scale.

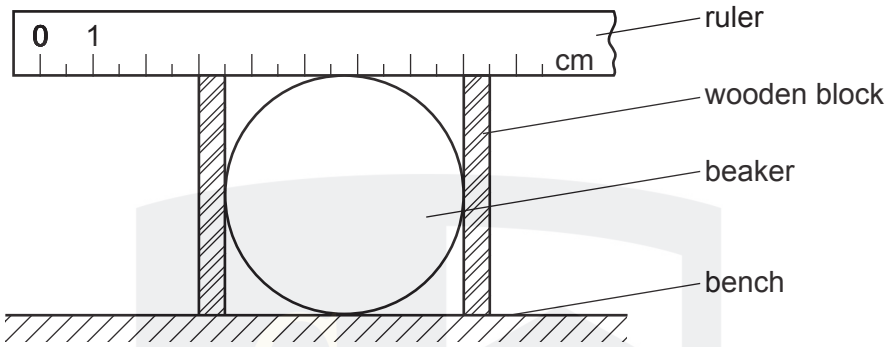


What is the reading on the vernier scale?

A 6.50 cm **B** 6.55 cm **C** 7.00 cm **D** 7.05 cm

CHEMISTRY ONLINE TUITION

49 The diagram shows one method of measuring the diameter of a beaker.



What is the diameter of the beaker?

A 4.5 cm **B** 5.0 cm **C** 5.5 cm **D** 8.0 cm

50 A student studies some equations.

power = work / time

force = mass × acceleration

velocity = displacement / time

How many vector quantities are contained in the equations?

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

51 Which instrument is used to measure the internal diameter of a pipe with a single measurement?

A manometer

B measuring cylinder

C micrometer

D vernier calipers

52 Which is the correct statement about force and velocity?

A Force and velocity are both scalars.

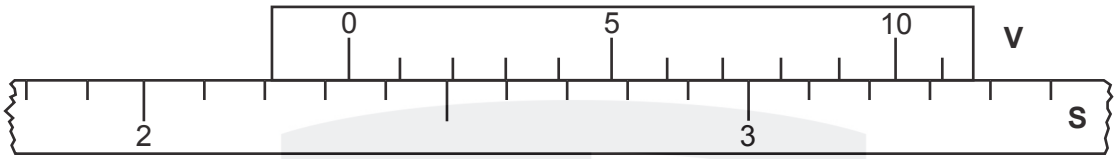
B Force and velocity are both vectors.

C Force is a scalar, velocity is a vector.

D Force is a vector, velocity is a scalar.

CHEMISTRY ONLINE TUITION

53 The diagram shows a vernier **V** placed against a scale **S**.



What is the vernier reading?

A 2.23 **B** 2.26 **C** 2.33 **D** 2.36

54 A student has been asked to determine, as accurately as possible, the volume of a piece of wire. The wire is about 80 cm long and about 0.2 cm in diameter.

Which measuring instruments should the student use?

	length	diameter
A	metre rule	micrometer
B	metre rule	vernier callipers
C	micrometer	vernier callipers
D	vernier callipers	micrometer

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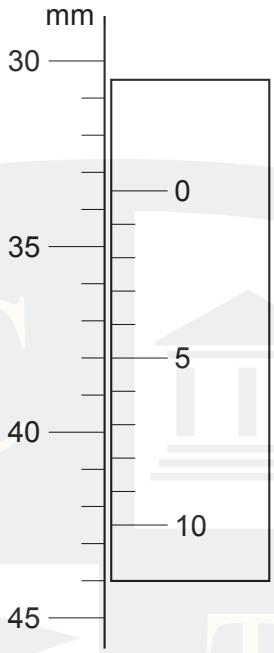
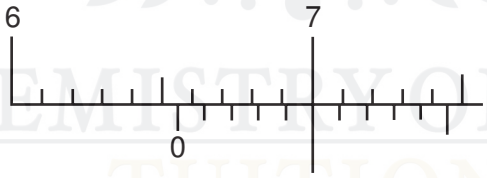
55 The diagram shows part of a vernier scale.



What is the correct reading?

A 30.5 mm **B** 33.5 mm **C** 38.0 mm **D** 42.5 mm

56 The diagram shows part of a vernier scale.



What is the reading on the vernier scale?

A 6.50 cm

B 6.55 cm

C 7.00 cm

D 7.45 cm

CHEMISTRY ONLINE TUITION

57 Which of the following groups of physical quantities consists only of scalars?

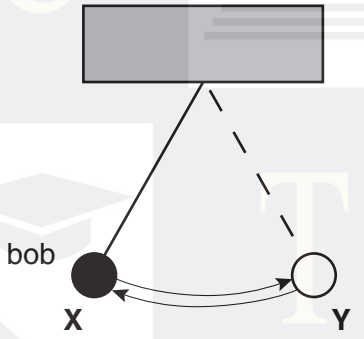
A acceleration, force, velocity

B acceleration, mass, speed

C force, time, velocity

D mass, speed, time

58 One oscillation of a swinging pendulum occurs when the bob moves from **X** to **Y** and back to **X** again.



Using a stopwatch, which would be the most accurate way to measure the time for one oscillation of the pendulum?

A Time 20 oscillations and multiply by 20.

B Time 20 oscillations and divide by 20.

C Time one oscillation.

D Time the motion from **X** to **Y**, and double it.

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