ST JOSEPH'S INSTITUTION
END-OF-YEAR EXAMINATION 2020
(YEAR 3)

CANDIDATE NAME								
CLASS						INDEX NUMBER		

PHYSICS **6091/01**

Paper 1 **7 OCTOBER 2020**

Additional Materials: Multiple Choice Answer Sheet **45 minutes (08:00 – 08:45)**

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue, or correction fluid.
Write your name, class and index number in the spaces provided.

There are **thirty** questions on this paper. Answer **all** questions.
For each question there are four possible answers **A, B, C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Multiple Choice Answer Sheet.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done on this question paper.

1 In a practical session, a student needs to measure the internal diameter, depth and thickness of a glass beaker.

Which of the following instrument(s) should the student use?

A micrometer only
B vernier caliper only
C micrometer and vernier calliper
D micrometer or vernier calliper

2 Fig. 2.1 shows the reading of the vernier calliper when it is completely closed. Fig 2.2 shows the reading of the same vernier calliper used to measure the thickness of a book.

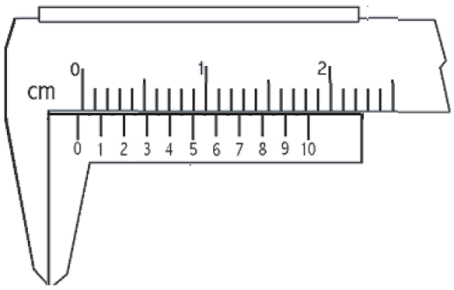


Fig. 2.1

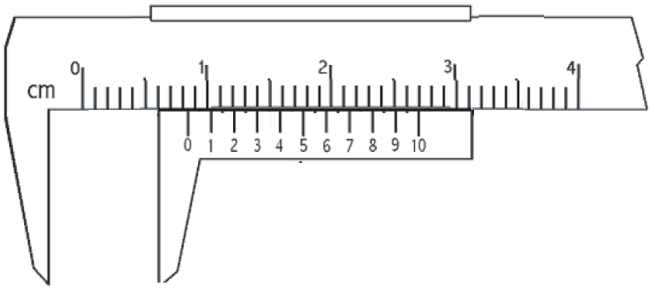


Fig. 2.2

What is the thickness of the book?

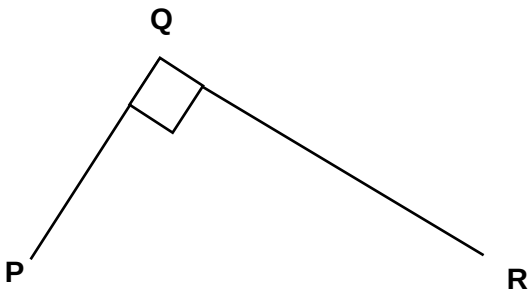
A 0.59 cm **B** 0.77 cm **C** 0.79 cm **D** 0.89 cm

3 An object is propelled vertically upward with an initial velocity of 40 m/s. Ignoring air resistance, what is the velocity of the object 5.0 s later?

A - 40 m/s **B** - 10 m/s **C** 8.0 m/s **D** 10 m/s

4 The table below describes the motion of an object travelling from **P** to **R**.

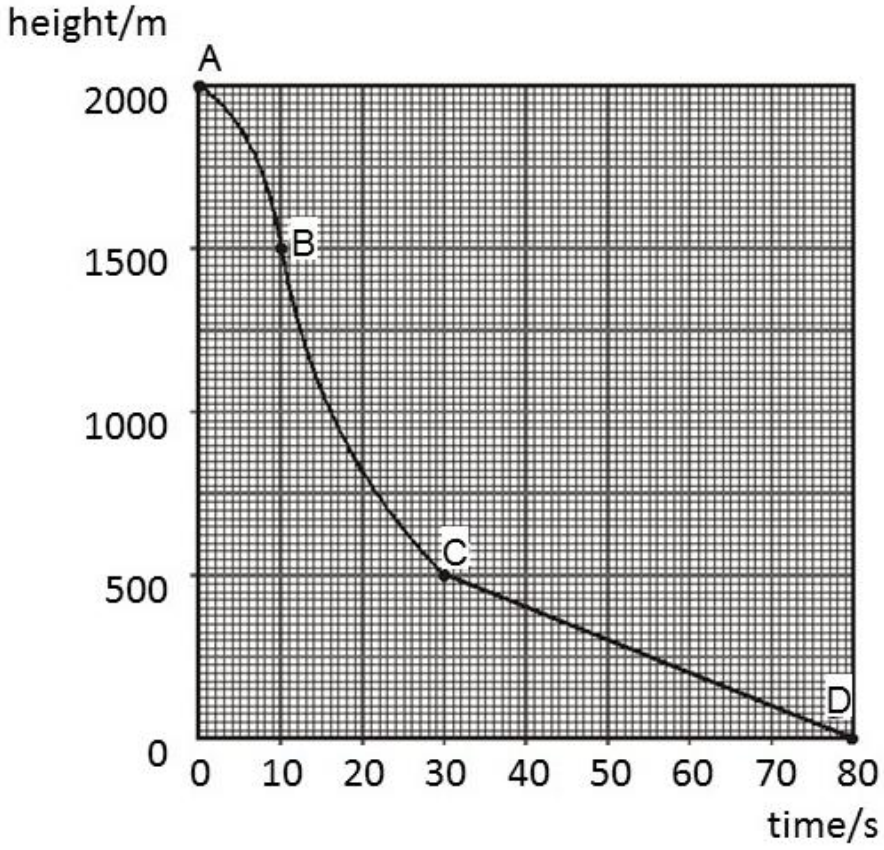
	distance / m	*time taken / s*
P to **Q**	3.0	3.0
Q to **R**	4.0	6.0



What is the average velocity of the object over the period of 9.0 s?

A 0.56 m/s **B** 0.78 m/s **C** 1.0 m/s **D** 5.0 m/s

5 The graph shows how the height of a skydiver changes with time after he jumped from a plane.



Which of the following statements best describes the motion of the skydiver?

A From A to B the skydiver is undergoing acceleration.

B From B to C the skydiver is undergoing decreasing deceleration

C The speed of the skydiver is decreasing throughout the whole 80 s duration.

D The skydiver fell through a distance of 12 500 m while travelling at constant speed.

6 An object was pulled up the slope with a constant force. The object moves up with a constant velocity of 5.0 cm/s.

Which of the following statements correctly explain why the object moves at a constant velocity of 5.0 cm/s?

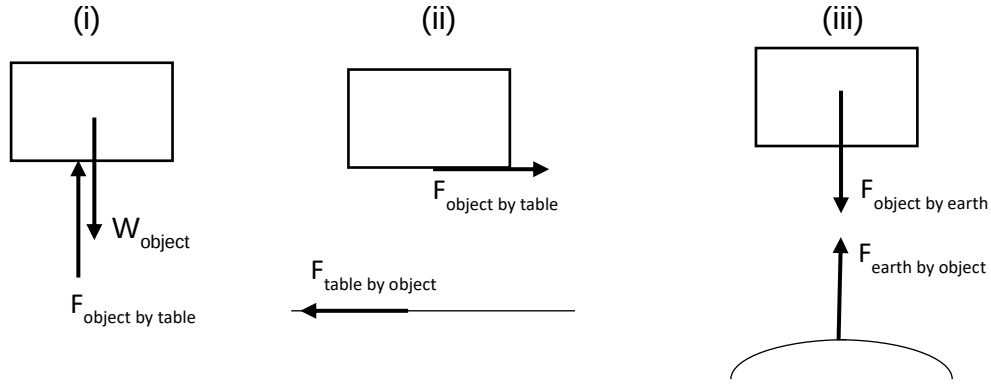
A The pulling force on the object is equal to the frictional force acting on the object .

B The pulling force of the object is equal to the frictional force acting on the object and the component of the weight of the object that is parallel to the direction of motion.

C The resultant force of the weight, the pulling force on the object and the frictional force is 0 N.

D The weight of the force is equal to the pulling force on the object.

7 An object moves to the right on a table. The diagrams below show the forces acting on the object, table and earth.



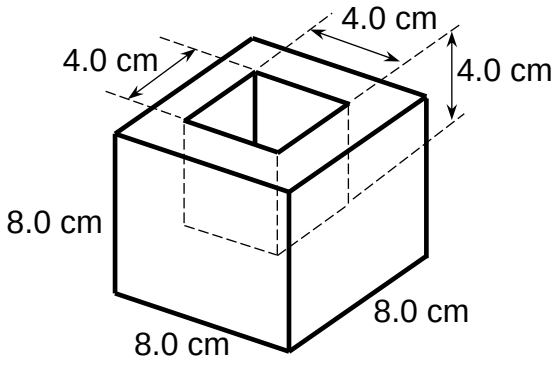
Which of the following shows the correct action-reaction pair of forces?

A (i) **B** (iii) **C** (ii) and (iii) **D** (i), (ii) and (iii)

8 When a constant force of 20 N is applied on a 200 g object, the object moves at a constant velocity of 0.50 m/s. What is the acceleration of the object if the constant force increases to 30 N?

A 50 m/s^2 **B** 100 m/s^2 **C** 150 m/s^2 **D** 250 m/s^2

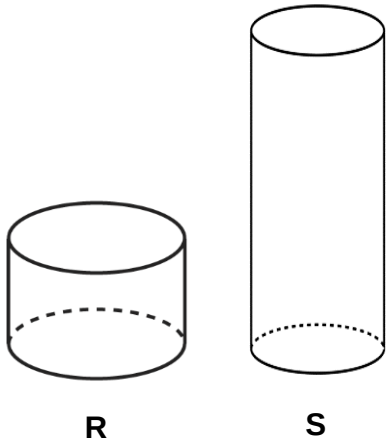
9 A cube, made of aluminium, has sides of length 8.0 cm. The centre portion of the aluminium cube is removed such that a smaller cubic hole of 4.0 cm sides is formed.



Another cube of 4.0 cm sides, made of copper, is then inserted into this hole. If the density of aluminium is 2.7 g/cm^3 and copper is 9.0 g/cm^3, what is the density of the composite cube?

A 2.70 g/cm^3
B 3.50 g/cm^3
C 4.30 g/cm^3
D 5.90 g/cm^3

10 Two cylinders, R and S, are made of zinc. The height of R is half the height of S, and the diameter of R is twice that of S.

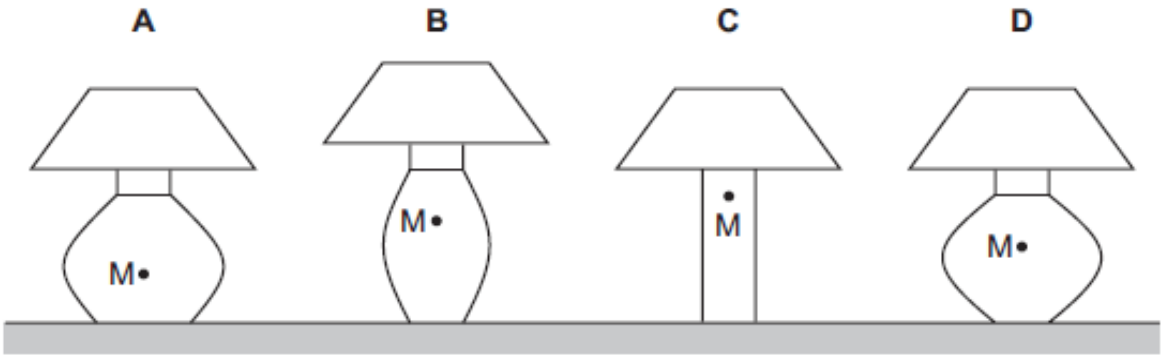


Which of the following statements is correct?

A The density of R is half that of S.
B The density of R is equal to that of S.
C The density of R is twice that of S.
D The density of R is four times that of S.

11 The figure shows four table lamps where M is the centre of gravity of each lamp.

Which lamp is the least stable?

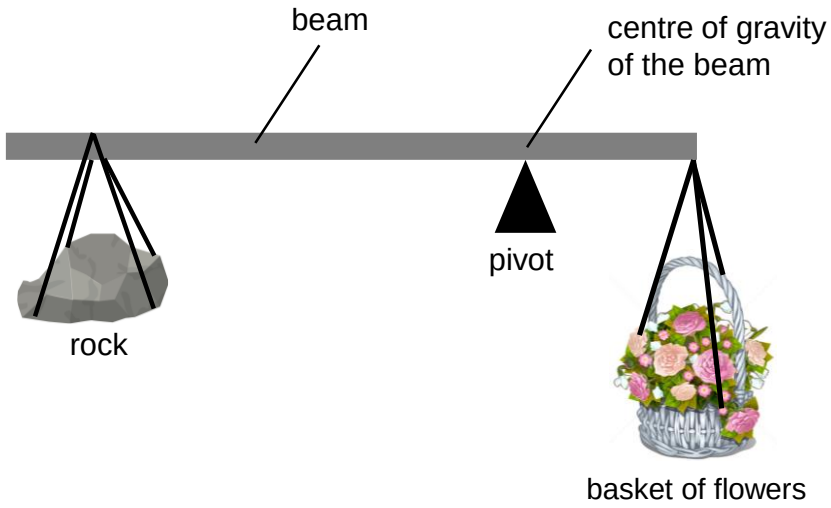


12 To ensure that a racing car making a sharp turn at high speed does not topple, two factors affecting the stability of the car are considered: the height of the car's centre of gravity and the distance between its front wheels.

Which of the following will make the car most stable?

	centre of gravity	*distance between front wheels*
A	high	large
B	high	small
C	low	large
D	low	small

13 A beam acting as a balance is used to determine the mass of a basket of flowers. At equilibrium, the pivot is closer to the basket of flowers than to the piece of rock.



What is the mass of the basket of flowers?

A It is less than the mass of the rock

B It is more than the mass of the rock

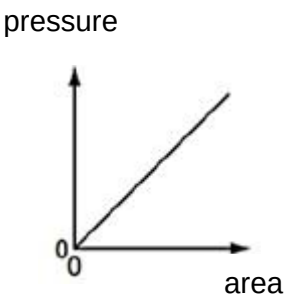
C It is the same as the mass of the rock

D It is not possible to determine

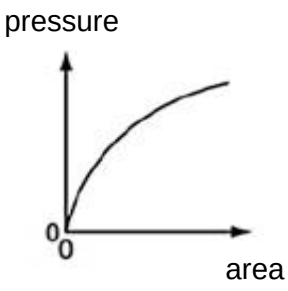
14 A graph is plotted to show the relationship between the pressure exerted by the weight of a block on a table and the base area of the block in contact with the table.

Given that the weight of the block is constant, which graph shows the relationship correctly?

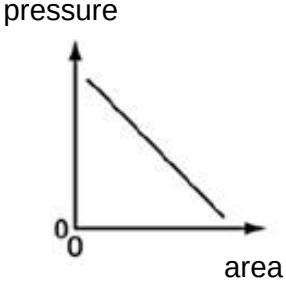
A



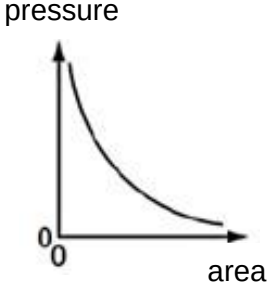
B



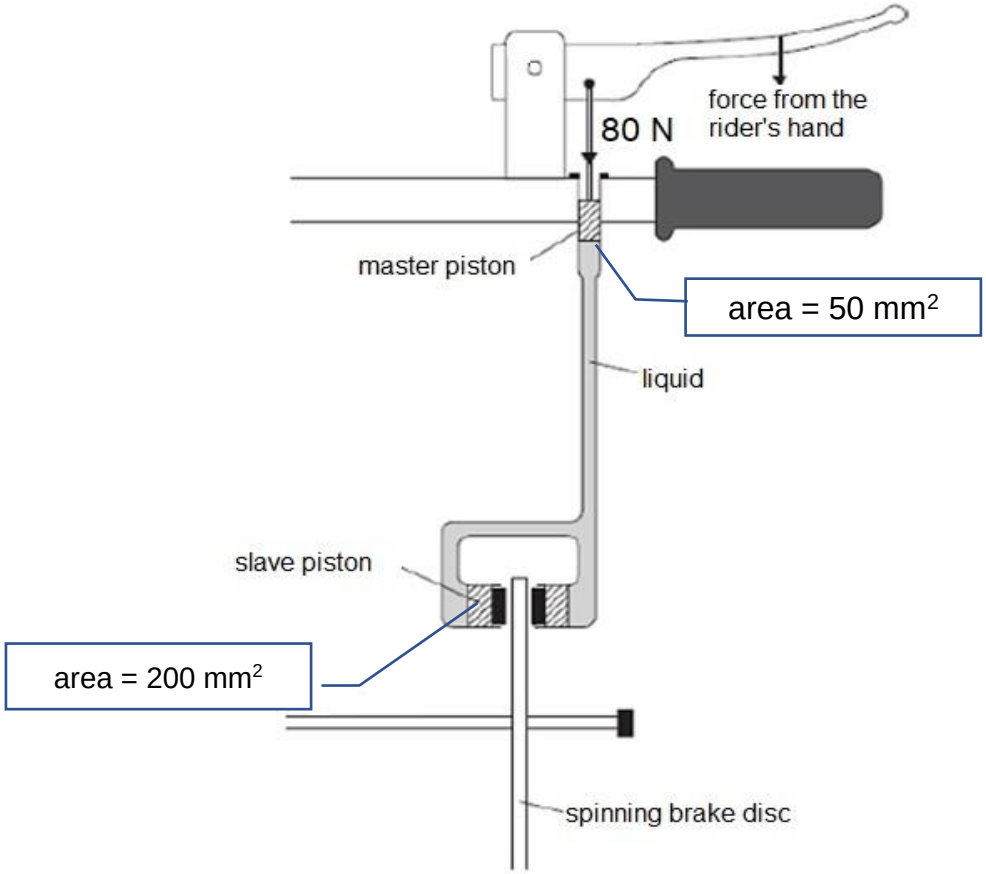
C



D



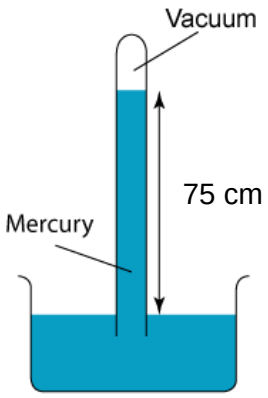
15 The figure below shows a brake system of a mountain bike. The mountain bike uses liquid-filled tubes to transmit pressure from the master piston to the slave pistons.



A force of 80 N is applied on the master piston.
What is the force exerted by the liquid on one of the slave pistons?

A 1.6 N **B** 20 N **C** 200 N **D** 320 N

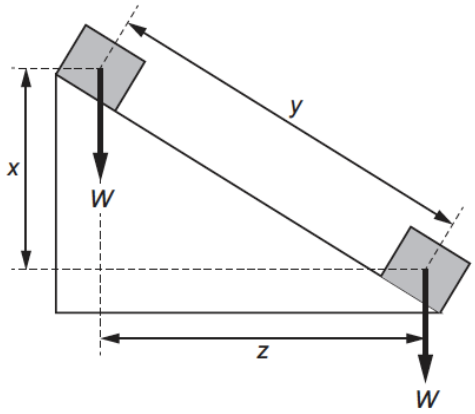
16 The height of the mercury column in a barometer is recorded as 75 cmHg on Earth. The barometer is brought to another planet where the atmospheric pressure is one third that of Earth and the gravitational field strength is double that on Earth.



What will be the recorded height of the mercury on this planet?

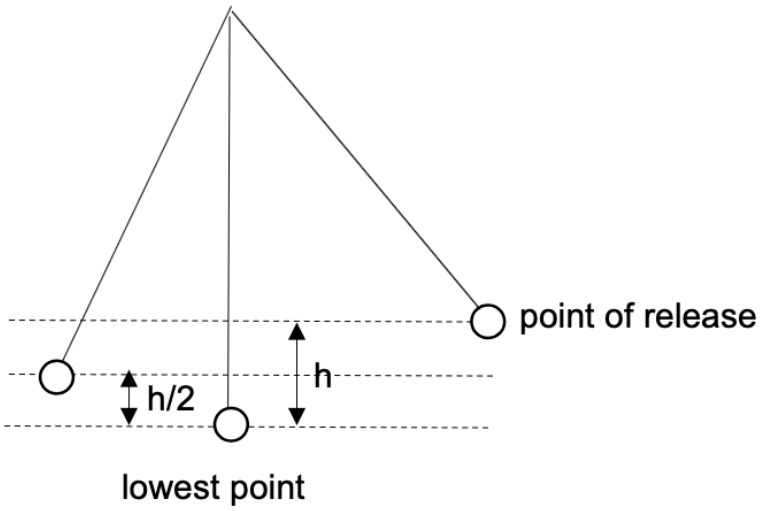
A 12.5 cm **B** 37.5 cm **C** 50.0 cm **D** 150 cm

17 What is the work done by the weight of the box to move from the top to the bottom of the slope?



A Wy **B** Wx **C** W(y-x) **D** W(x+z)

18 A pendulum bob of mass m, attached to a light string, is released from rest at a height h above its lowest point. The speed of the bob at its lowest point is u.
Ignoring air resistance, what will be the speed of the bob when it reaches a height of $\frac{h}{2}$ on the other side?



A $u/\sqrt{2}$ **B** u/2 **C** u **D** $u\sqrt{2}$

19 A car maintains a power of 1200 W when it is moving at a constant speed of 15 m/s. What is the resistive force acting on the car when it is moving at the constant speed of 15 m/s?

A 15 N **B** 40 N **C** 60 N **D** 80 N

20 It is observed that pollen grains suspended in water move in continuous and random direction.

Which of the following is the correct explanation for this observation?

A The air particles move continuously and constantly collide with the pollen grains.

B The pollen grains move continuously and constantly collide with one another.

C The pollen grains move continuously and constantly collide with the water particles.

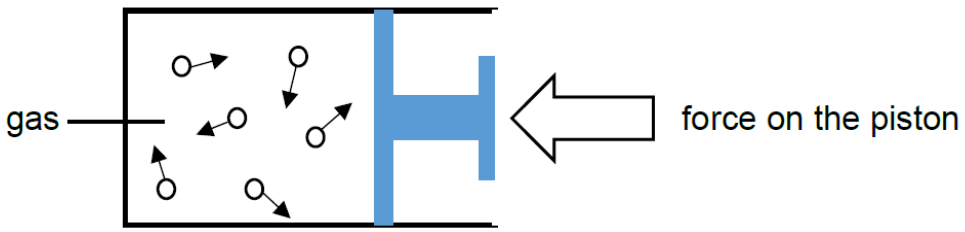
D The water particles move continuously and constantly collide with the pollen grains.

21 A balloon tied to a brick is submerged into a tank containing water. The water is cooled from 40°C to 20°C.

Which of the following correctly shows what will happen to the air particles in the balloon?

	force on the wall of the balloon	*frequency of collision on the wall of the balloon*	*distance between the air particles*
A	decreases	decreases	decreases
B	decreases	increases	decreases
C	increases	decreases	increases
D	increases	increases	increases

22 The piston shown below is pushed slowly into a sealed syringe. The gas inside the sealed syringe is compressed under constant temperature.



Which of the following is/are correct?

(i) The average speed of the gas molecules remains unchanged.
(ii) The gas molecules collide with the syringe more frequently.
(iii) In each collision, a larger force acts on the wall of the syringe by each gas molecule.

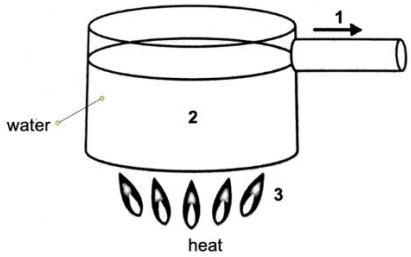
A (i) only

B (i) and (ii) only

C (ii) and (iii) only

D (i), (ii) and (iii) only

23 A saucepan is used to heat some water as shown below.



What are the main modes of energy transfer in each of the areas numbered on the figure?

	1	*2*	*3*
A	conduction	radiation	convection
B	conduction	convection	radiation
C	convection	conduction	radiation
D	radiation	convection	conduction

24 A cup made from silver is filled with boiling water from a kettle.
Which of the following best explains why a man who touches the outer surface of the cup finds that it is extremely hot?

A A shiny surface is a good emitter of infrared radiation.
B Boiling water gives out heat.
C Convection takes place in the boiling water.
D Silver is a good conductor of heat.

25 Which of the following is the best absorber of infrared radiation?

A dark animal fur
B shiny metal
C transparent window glass
D white paper

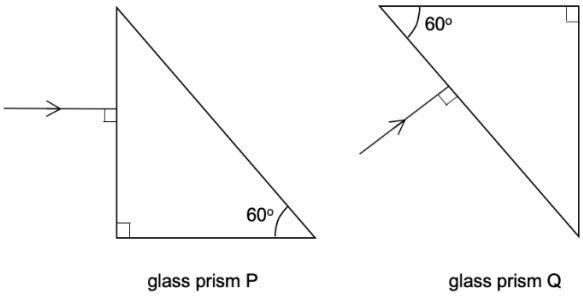
26 Which of the following is not the thermometric property of a thermometer?

A the electromotive force of a thermocouple
B the pressure of the constant mass gas thermometer
C the resistance of resistance thermometer
D the volume of a liquid-in-glass thermometer

27 A thermocouple is used to measure the temperature of an unknown liquid. The temperature at the reference junction is always kept at 10°C. When the measuring junction of the thermocouple is place in a liquid of temperature 100°C, the voltmeter reads 15 mV. What is the voltmeter reading if the measuring junction of the thermocouple is placed in another liquid of temperature 200°C?

A 7.1 mV **B** 30 mV **C** 32 mV **D** 47 mV

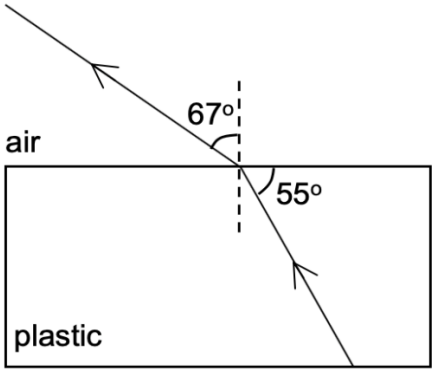
28 Light is incident at 90° on the surfaces of two glass prisms P and Q as shown.



The critical angle for light travelling from glass into air is 42°.
Which prism will result in light undergoing total internal reflection?

A P only
B Q only
C Both P and Q
D Neither P nor Q

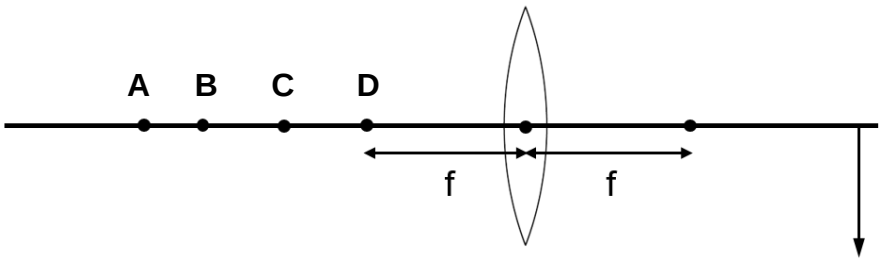
29 A ray of light travels from plastic to air as shown.



The speed of light in air is 3.0×10^8 m/s. What is the speed of light in plastic?

A 1.9×10^8 m/s
B 2.7×10^8 m/s
C 3.0×10^8 m/s
D 4.8×10^8 m/s

30 The diagram shows a thin converging lens of focal length f.
Where must an object be placed to produce a real image in the position shown?



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