Class	Register Number	Name

南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2015
Secondary Three

PHYSICS **45 minutes**

Paper 1 Multiple Choice **08:00 – 08:45**

Friday **09 October 2015**

Additional materials: Optical Answer Sheet (OAS)

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.
Write your name, register number and class in the spaces at the top of this page.

Do not use staples, paper clips, highlighters, glue or correction fluid on the Multiple Choice **Optical Answer Sheet** (OAS) provided.

Write in soft pencil your name, class and register number on the Optical Answer Sheet.

There are **thirty** questions in 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 Optical Answer Sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

The use of an approved scientific calculator is expected, where appropriate.

Any rough working should be done in this booklet.

The gravitational field strength g is 10 N kg^{-1} (near the Earth's surface).

1 Which of the following shows a physical quantity and its correct unit in terms of SI base units?

A	energy	kg m s^{-2}
B	force	kg m s^{-1}
C	moment of a force	kg m^2 s^{-2}
D	power	kg m s^{-3}

2 A micrometer screw gauge is used to measure the external diameter of a plastic tube.

Diagram 1 shows the reading on the micrometer when it is tightened with nothing between the jaws.

Diagram 2 shows the reading taken with the plastic tube between the jaws to measure its external diameter.

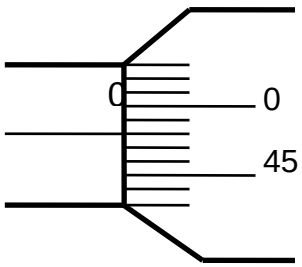


diagram 1

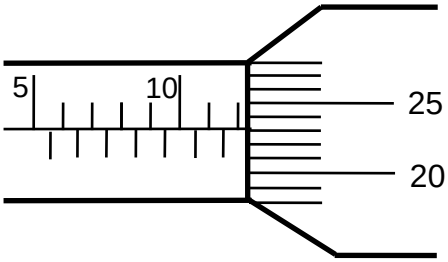


diagram 2

If the tube material has a thickness of 1.10 mm, what is the internal diameter of the tube?

A 9.55 mm

B 10.05 mm

C 10.13 mm

D 10.51 mm

3 Which of the following consists of only vector quantities?

A mass, force, moment of force

B pressure, velocity, force

C velocity, weight, displacement

D work done, force, moment of force

4 A runner runs 4.0 km towards the South in 0.50 hour and 5.0 km towards the East in 1.5 hours.

What is his average speed?

A 4.5 km h^{-1}

B 5.0 km h^{-1}

C 5.7 km h^{-1}

D 21 km h^{-1}

5 A moving car drips oil onto the road at a constant rate.

The pattern of drips on the road is shown in the diagram below.

Which statement best describes the motion of the car?

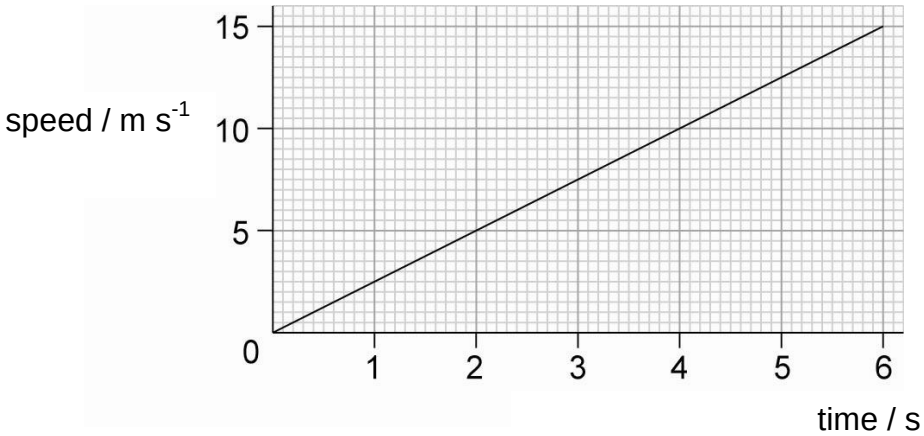
A It accelerated and then decelerated.

B It accelerated and then travelled at a steady speed.

C It travelled at a steady speed and then accelerated.

D It travelled at a steady speed and then decelerated.

6 The speed-time graph below shows a car starting from rest and then uniformly accelerating to a speed of 15 m s^{-1} in 6.0 s.



What is the distance travelled by the car in 6.0 s?

A 5 m **B** 15 m **C** 45 m **D** 90 m

7 An object falls vertically from rest through the air until it attains its terminal velocity.

How does the acceleration of the object change during the fall?

A The acceleration decreases from 10 m s^{-2} to 0 m s^{-2}.

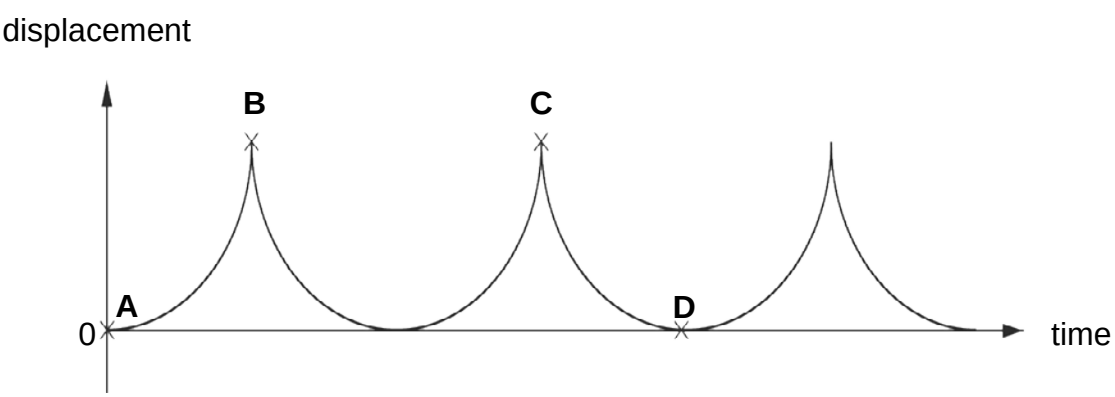
B The acceleration increases from 0 m s^{-2} to 10 m s^{-2}.

C The acceleration remains constant at 10 m s^{-2}.

D The acceleration remains constant at 0 m s^{-2}.

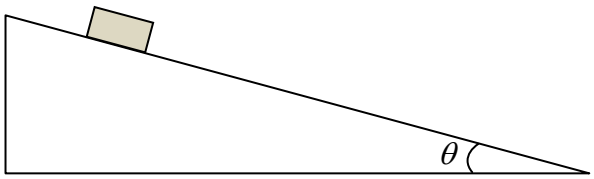
8 The graph shows how the displacement of a ping-pong ball changes over time. It is released with zero initial speed at time t = 0 s from a height of 1.0 m above a table.

The ping-pong ball bounces several times on the table. Neglect air resistance.



Which point in the graph represents the instant when the ping-pong ball hits the table the second time?

9 The diagram shows a box placed on a smooth inclined plane with an adjustable angle θ.



The angle θ (measured from the horizontal) is increased from 0° to 90°.

Which of the following statements is **correct**?

A The acceleration due to gravity changes for different angles.

B The acceleration of the box along the inclined plane changes for different angles.

C The acceleration of the box along the inclined plane is constant for different angles.

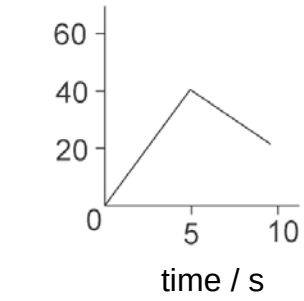
D The box moves at uniform speed along the inclined plane for different angles.

10 A skier is moving downhill.

Her acceleration on soft snow is 4.0 m s^{-2} and on hard snow is 8.0 m s^{-2}.

Which graph shows the motion of the skier when she is moving from soft snow to hard snow?

A



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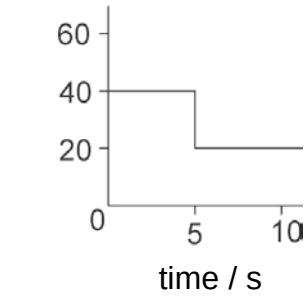

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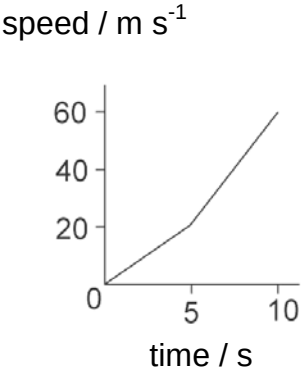

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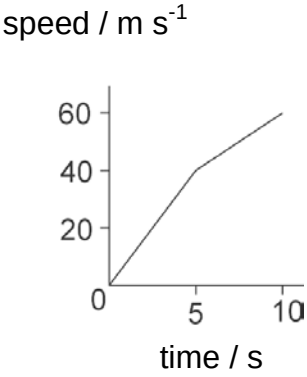


11 Which of the following **cannot** be the magnitude of the resultant force when two forces of magnitudes 8.0 N and 13.0 N act on an object?

A 5.0 N **B** 10.0 N **C** 18.0 N **D** 22.0 N

12 A lift and three men inside have a total mass of 600 kg.

If the lift is accelerating upwards with an acceleration of 1.10 m s^{-2}, what is the tension in the cable that is pulling the lift upwards?

A 1 560 N

B 4 830 N

C 5 060 N

D 6 660 N

13 Along a straight road, a 50.0 kg driver decelerated his car from 100 km h^{-1} to rest in just 1.40 s.

What is the magnitude of the force acting on the driver?

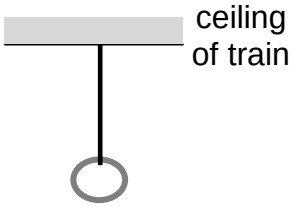
A 790 N

B 890 N

C 990 N

D 1000 N

14 The diagram shows a grab handle (or handgrip) hanging vertically inside a train. The grab handle is free to swing sideways.



Which of the following statements about the motion of the train is **correct**?

A The train is accelerating.

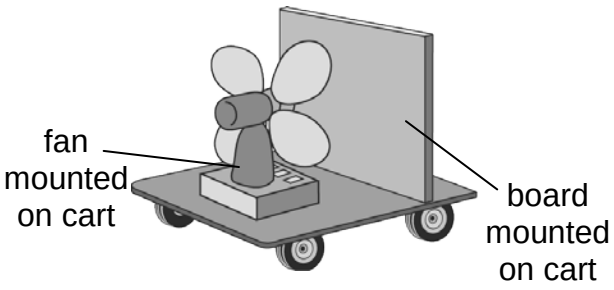
B The train is approaching its maximum speed.

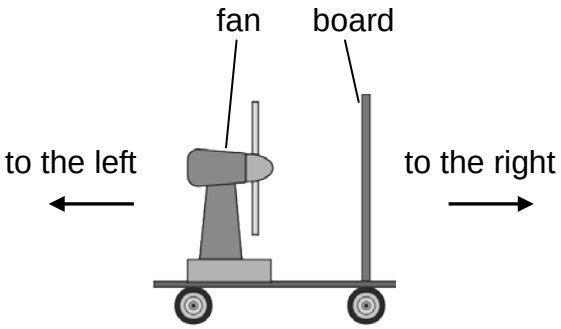
C The train is decelerating.

D The train is moving with a constant speed.

15 A cart is at rest on a frictionless horizontal surface.

A vertical board and a powerful battery-operated fan (just in front of the board) are firmly fixed onto the cart as shown in the diagrams below.





If the fan is switched on to blow air directly onto the board, which statement about the final motion of the cart is **correct**?

A The cart will not move.

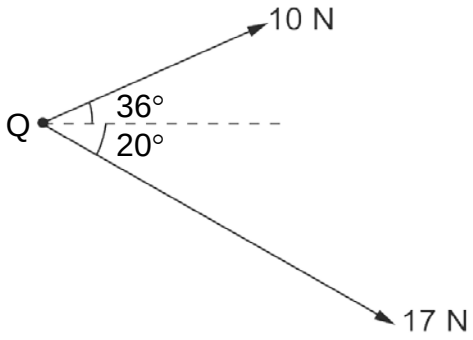
B The cart will move to the right.

C The cart will move to the left.

D The cart will move to and fro repeatedly.

16 Two forces of 10 N and 17 N act on a point mass Q as shown in the diagram below.

To keep Q in equilibrium, a third force is applied on Q in a horizontal direction.



What is the magnitude of this third force?

A 13 N

B 18 N

C 24 N

D 27 N

17 Which of the following statements describe(s) action and reaction pair(s) of forces?

(1) Gravitational force acted by Earth on you and the gravitational force acted by you on Earth.

(2) When hitting a baseball with a bat, the force acted on the ball by the bat and the force acted on the bat by the ball.

(3) When you are standing on the ground, your weight and the normal contact force on you.

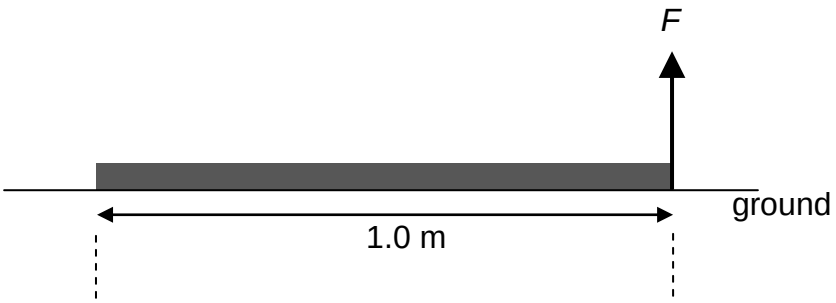
A (1) only

B (2) only

C (1) and (2) only

D (2) and (3) only

18 A 1.0 m uniform iron rod of mass 8.0 kg is being lifted from the ground by a vertical force *F* exerted at one end.

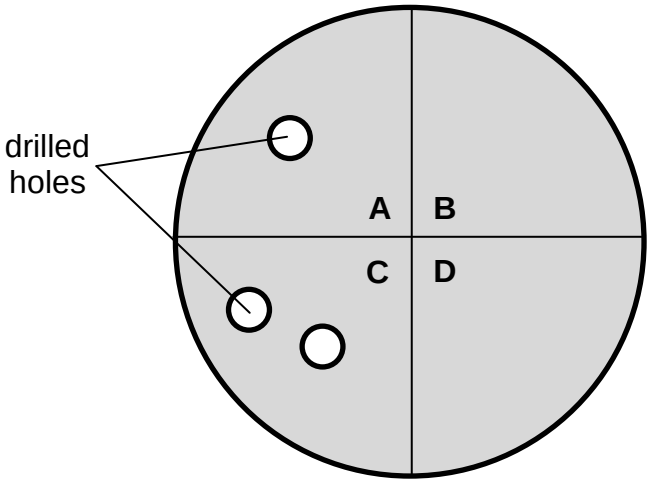


What is the minimum value of *F* required to lift the rod?

A 4.0 N **B** 8.0 N **C** 40 N **D** 80 N

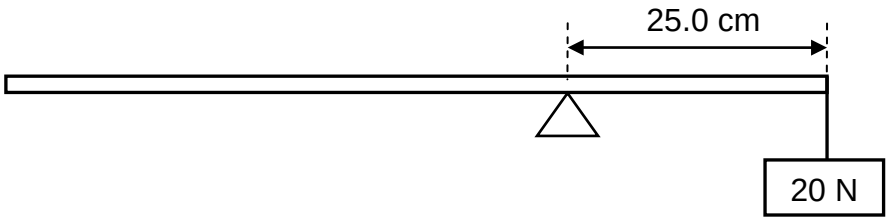
19 A plane circular lamina made of a homogeneous material has three holes drilled through it. The diagram shows the lamina divided into 4 equal quandrants **A**, **B**, **C** and **D**.

In which quadrant is the centre of gravity of the lamina?



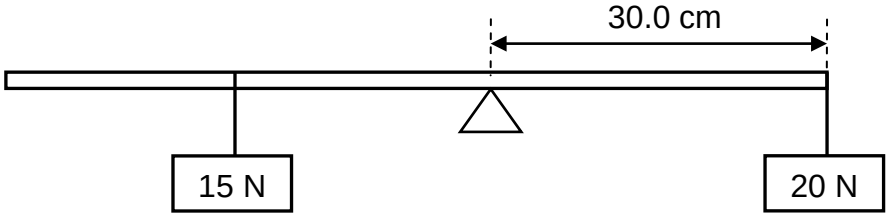
20 A non-uniform rod weighing 50 N is pivoted at 25.0 cm from its right end.

It is balanced by a 20 N weight.



The position of the pivot is then shifted 5.0 cm to the left.

The system is now balanced by hanging a 15 N weight on the rod as shown in the diagram below (not drawn to scale).



How far from the pivot should the 15 N weight be hung?

A 10.0 cm

B 12.0 cm

C 23.3 cm

D 52.5 cm

21 A cube with sides each of length x exerts a pressure of P on the floor it rests on.

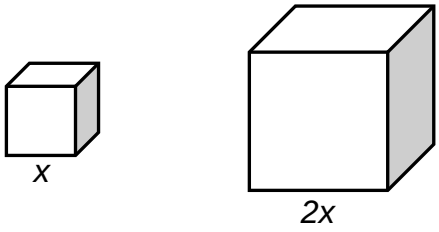
What is the pressure on the floor exerted by another cube made from the same material with sides each of length $2x$?

A 0.5 P

B P

C 2 P

D 4 P



22 In a large tank of liquid, at a point 180 cm below the surface of the liquid, the pressure due to the liquid alone is 100 kPa.

What is the density of the liquid?

A 0.556 kg m^{-3}

B 55.6 kg m^{-3}

C 556 kg m^{-3}

D 5560 kg m^{-3}

23 The diagram shows a smooth slide at a playground. A girl climbs up the steps on the left side of the slide and slides down the right side.

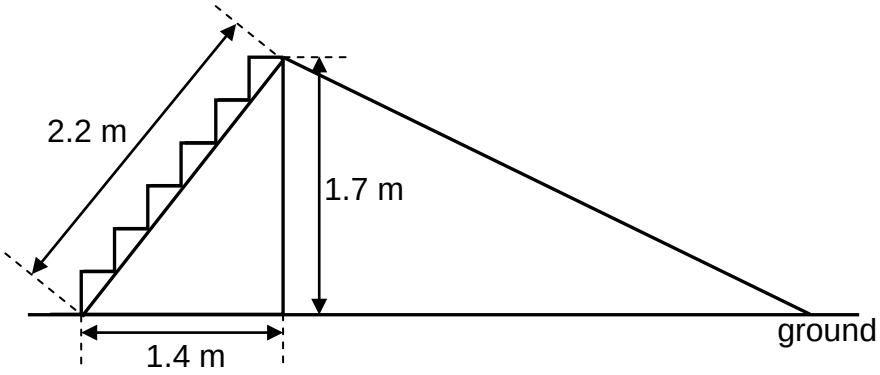
What is the speed of the girl when she reaches the ground?

A 5.3 m s^{-1}

B 5.8 m s^{-1}

C 6.6 m s^{-1}

D 34 m s^{-1}



24 A 500 W motor has 65% efficiency.

How much useful work can be done by this motor in 1 hour?

A 325 kJ

B 630 kJ

C 1170 kJ

D 1800 kJ

25 An object is placed 1.0 m in front of a plane mirror.

Which of the following statements is **incorrect**?

A The distance between the object and its image is 2.0 m

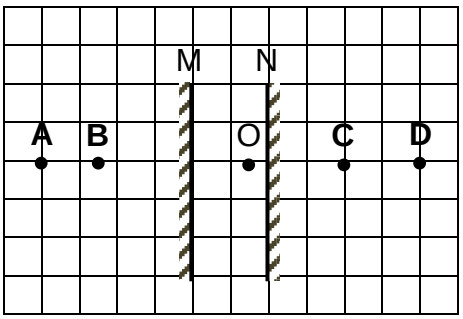
B The image is real and laterally inverted.

C The image is virtual and upright.

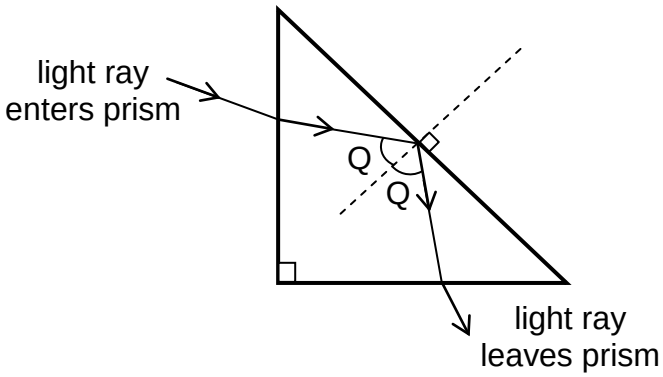
D The image is the same size as the object.

26 An object O is placed in between two mirrors M and N facing each other as shown in the diagram.

Which of the positions **A**, **B**, **C** or **D** is a possible location of the image of O?



27 The diagram shows the path of a ray of light that enters and leaves a right-angled prism.



The critical angle for light in the prism must be

A smaller than Q.

B smaller than (90° – Q).

C equal to Q.

D greater than Q.

28 The refractive index of a material is 2.0.

What is the speed of light in this material?

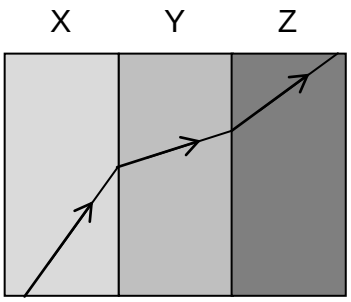
A 1.5×10^8 m s^{-1}

B 2.0×10^8 m s^{-1}

C 3.0×10^8 m s^{-1}

D 4.0×10^8 m s^{-1}

29 A light ray travels through three types of material X, Y and Z as shown in the diagram.



Which of the following correctly arranges the three types of materials with their refractive indices in order of increasing magnitude?

A Z, X, Y

B Z, Y, X

C X, Y, Z

D X, Z, Y

30 In which of the following situations is the refraction of light **not** possible when a light ray travels from one medium to another?

A when the angle of incidence of the light ray in the first medium is zero

B when the first medium is optically denser than the second medium

C when the refractive index of the second medium is too low

D when the second medium is optically denser than the first medium

End of paper