Monthly Test

Topics Covered: Momentum, Work and Energy, Pressure

Time: 1 hour

Max Marks: 20

Multiple Choice Questions (MCQ's) (12 marks)

Q1

An air pistol fires a pellet forwards.

What is the motion of the air pistol?

A   The air pistol moves backwards with speed greater than the pellet.

B   The air pistol moves backwards with speed less than the pellet.

C   The air pistol moves forward with speed greater than the pellet.

D   The air pistol moves forward with speed less than the pellet.

Q2

An object is moving at $+3.0\,\text{m/s}$.

A force acts on the object.

After a time, the object is moving at $-4.0\,\text{m/s}$.
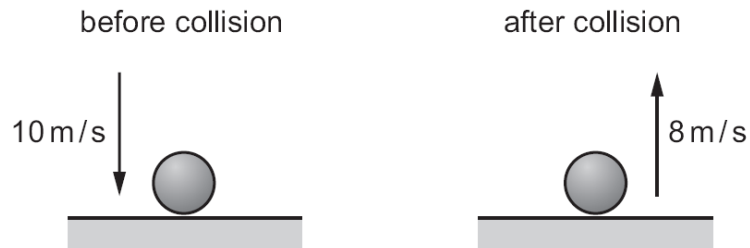
The mass of the object is $5.0\,\text{kg}$.

What is the change in momentum of the body?

A $-35\,\text{kg m/s}$ **B** $-5.0\,\text{kg m/s}$ **C** $+5.0\,\text{kg m/s}$ **D** $+35\,\text{kg m/s}$

Q3

A ball of mass 0.50 kg falls and hits the floor at 10 m/s.

It rebounds at speed 8.0 m/s, as shown.

before collision   after collision

10 m/s   8 m/s

The collision between the ball and the floor lasts for 0.50 s.

What is the average force acting on the ball during the collision?

A   2.0 N upwards

B   2.0 N downwards

C   18 N upwards

D   18 N downwards

Q4

Which row describes an advantage and a disadvantage of wind turbines?

	advantage	disadvantage
A	no fuel needed	harmful gases released
B	variable supply	fuel needed
C	no harmful gases released	variable supply
D	constant supply	noisy

Q5

The diagram shows part of a rollercoaster ride with the car at different positions.

The car runs freely down from position X to position Y and up the hill on the other side.
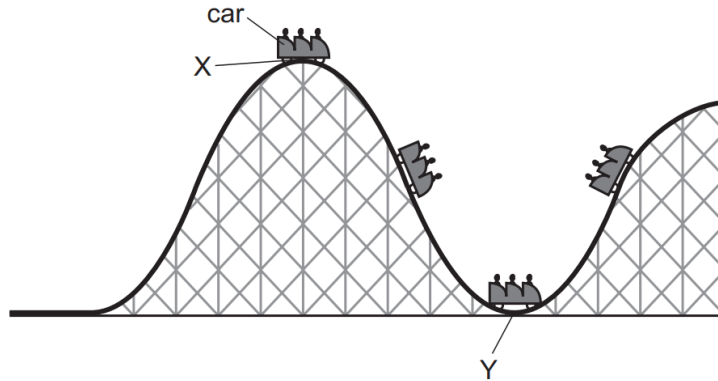
What happens to the kinetic energy and to the gravitational potential energy of the car as it moves from position X to position Y?

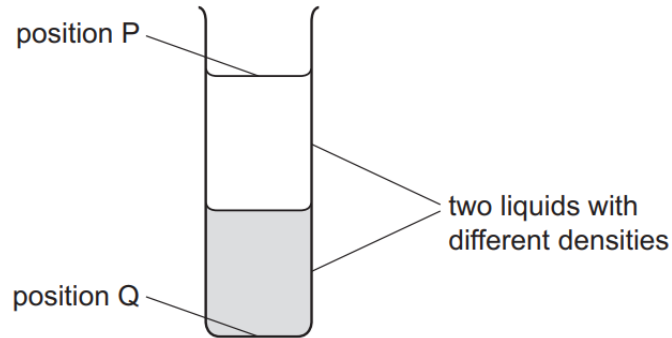|	kinetic energy	gravitational potential energy
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Q6

A car, travelling on a straight horizontal road, has 1.6 MJ of kinetic energy. It accelerates for 20 s until it has 2.5 MJ of kinetic energy.

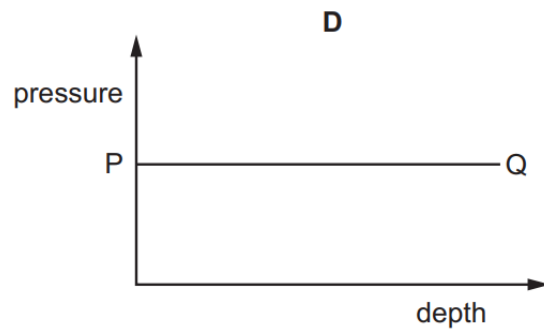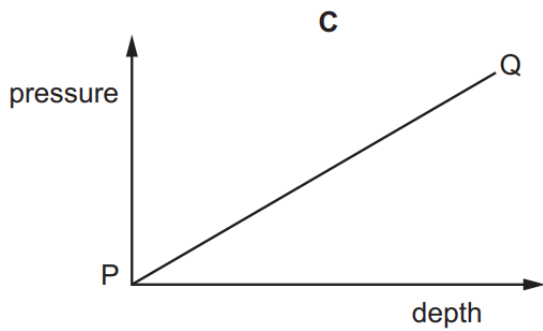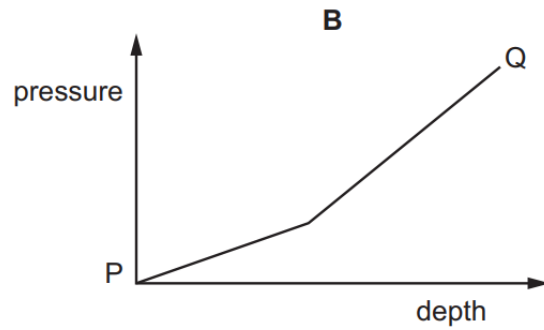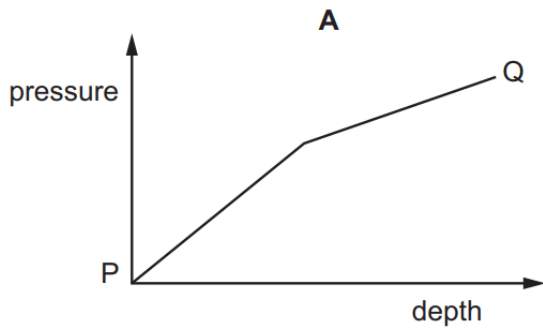What is the average power output used to increase the kinetic energy of the car?

A 45 W   **B** 205 W   **C** 45 kW   **D** 205 kW

Q7

A tall cylinder is partly filled with two liquids which do not mix. The two liquids have different densities. A student measures the pressure due to the liquids at different depths.
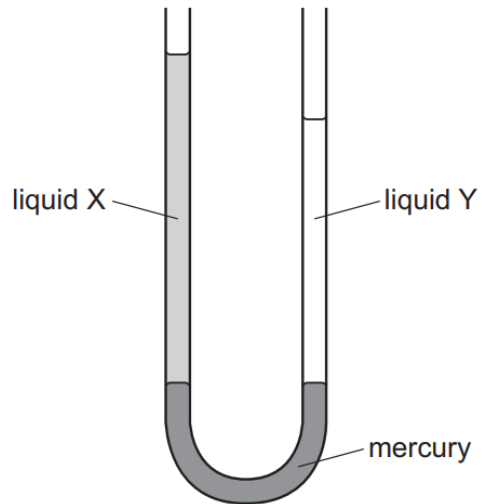
position P

two liquids with
different densities

position Q

Which graph shows how the liquid pressure varies between positions P and Q?

A

pressure

Q

P

depth

B

pressure

Q

P

depth

C

pressure

Q

P

depth

D

pressure

P

Q

depth

Q8

The diagram shows a U-tube manometer containing three liquids: mercury, liquid X and liquid Y. Neither liquid X or liquid Y mixes with mercury.

liquid X ——

—— liquid Y

—— mercury

Which row compares the pressure exerted by liquid X and by liquid Y on the mercury, and the density of liquid X and the density of liquid Y?

	pressure exerted by X and by Y on the mercury	densities of X and of Y
A	pressure of X is greater than Y	density of X is greater than Y
B	pressure of Y is greater than X	density of Y is greater than X
C	pressure of X and of Y is the same	density of X is greater than Y
D	pressure of X and of Y is the same	density of Y is greater than X

Q9
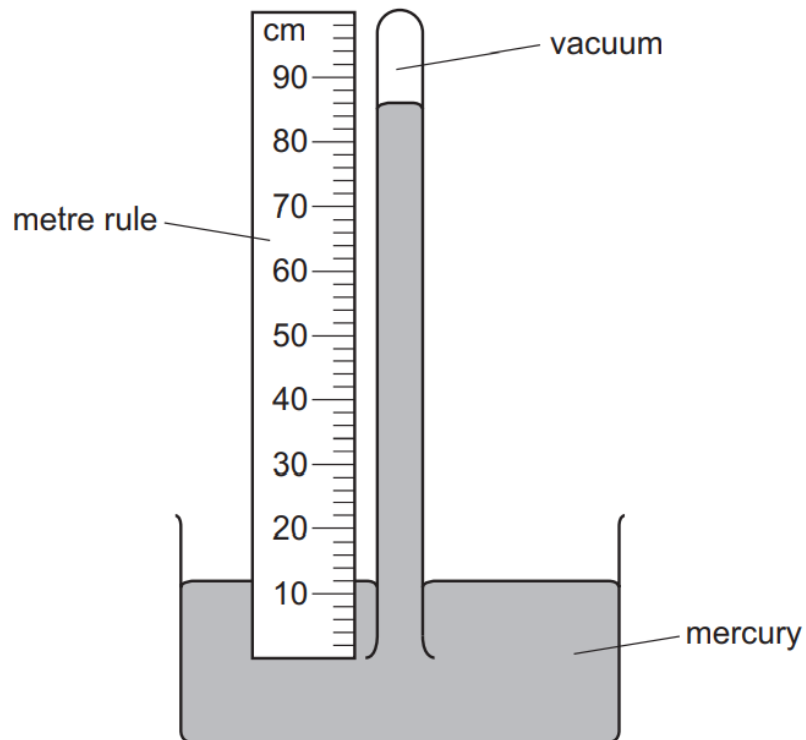
A skier is standing still on a flat area of snow.

skis

The weight of the skier is 550 N. The total area of his skis in contact with the ground is 0.015 m².

What is the pressure exerted on the ground by the skier?

A   0.83 N/m²   **B**   8.3 N/m²   **C**   3700 N/m²   **D**   37 000 N/m²

Q10

The diagram shows a simple mercury barometer.
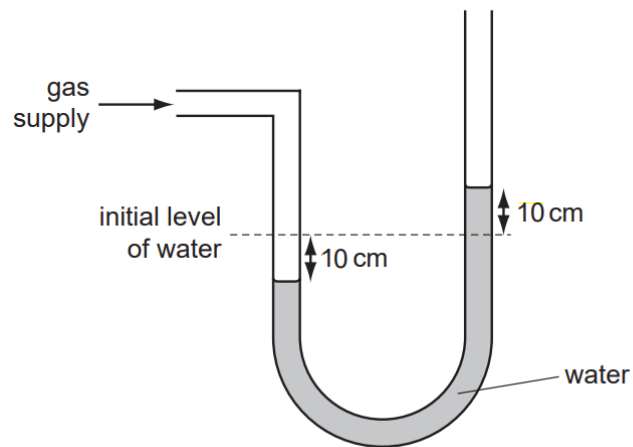

Which length is used to find the value of atmospheric pressure?

A   12 cm   **B**   74 cm   **C**   86 cm   **D**   100 cm

Q11

A water manometer is used to measure the pressure of a gas supply.

When it is attached to the gas supply, the water falls on the left side and rises on the right side. The difference in the levels of water on the two sides is now 20 cm.

What is the pressure of the gas supply?

A   the pressure due to 10 cm depth of water

B   the pressure due to 20 cm depth of water

C   the pressure due to 10 cm depth of water plus atmospheric pressure

D   the pressure due to 20 cm depth of water plus atmospheric pressure

Q12

A chair is placed on protective cups to prevent damage to the carpet underneath it.

chair

carpet

protective cups
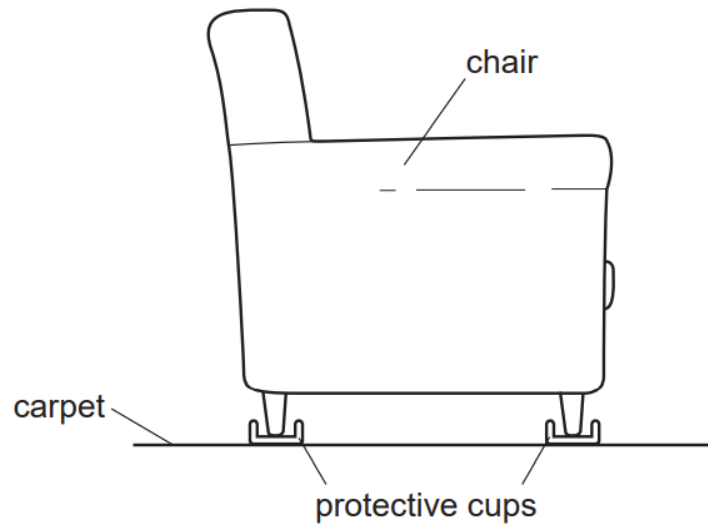
How do the cups change the area of contact with the carpet and the pressure on it?

	area of contact	pressure
A	decreased	decreased
B	decreased	increased
C	increased	decreased
D	increased	increased

Theory (8 marks)

Fig. 2.1 shows an athlete crossing the finishing line in a race. As she crosses the finishing line, her speed is 10.0 m/s. She slows down to a speed of 4.0 m/s.
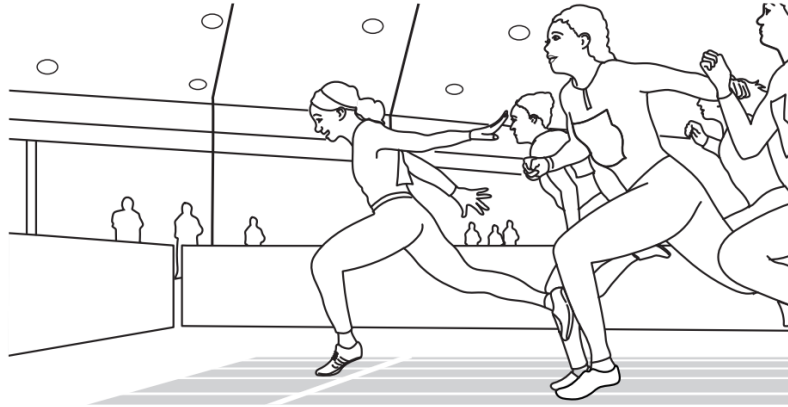

Fig. 2.1

(a) The mass of the athlete is 71 kg. Calculate the impulse applied to her as she slows down.

impulse = ... [3]

(b) (i) Define *impulse* in terms of *force* and *time*.

....

.... [1]

(ii) The athlete takes 1.2 s to slow down from a speed of 10.0 m/s to a speed of 4.0 m/s.

Calculate the average resultant force applied to the athlete as she slows down.

force = ... [2]

(c) Calculate the force required to give a mass of 71 kg an acceleration of 6.4 m/s².

force = ... [2]

[Total: 8]