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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Motion (Kinematics)

Paper 1 — Multiple-Choice Questions (topical compilation)

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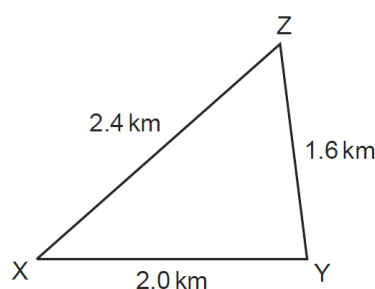
KINEMATICS / MOTION

PAPER 1 QUESTIONS

Speed, velocity and acceleration

QUESTION # 1:

- 2 A woman runs 2.0 km from X to Y in 20 minutes and then rests at Y for 10 minutes. She then takes 10 minutes to run 1.6 km from Y to Z.



What is the size of her average velocity for the journey from X to Z?

- A 0.060 km/minute
- B 0.080 km/minute
- C 0.090 km/minute
- D 0.130 km/minute

QUESTION # 2:

- 3 A cyclist travelling in a straight line at 8.0 m/s accelerates to 12 m/s in a time of 6.0 s.

Which expression gives the cyclist's acceleration?

- A $\frac{6}{12-8}$ B $\frac{8}{12-6}$ C $\frac{12-6}{8}$ D $\frac{12-8}{6}$

QUESTION # 3

- 5 Two cameras are a known distance apart. The exact time that a vehicle passes each of the cameras is recorded.

What can be obtained from the information?

- A average acceleration of the vehicle
- B average speed of the vehicle
- C maximum acceleration of the vehicle
- D maximum speed of the vehicle

QUESTION # 4

- 2 The table shows how the speeds of four bodies, **A**, **B**, **C** and **D**, change with time.

Which body has an acceleration that is **not** constant?

time / s	<u>speed of A</u> m/s	<u>speed of B</u> m/s	<u>speed of C</u> m/s	<u>speed of D</u> m/s
0	0	0	0	5.5
1	1.0	2.0	3.0	6.5
2	3.0	4.0	6.0	7.5
3	6.0	6.0	9.0	8.5

QUESTION # 5

- 2 A car begins to move. It speeds up until it reaches a constant speed. It continues to travel at this constant speed for the rest of the journey.

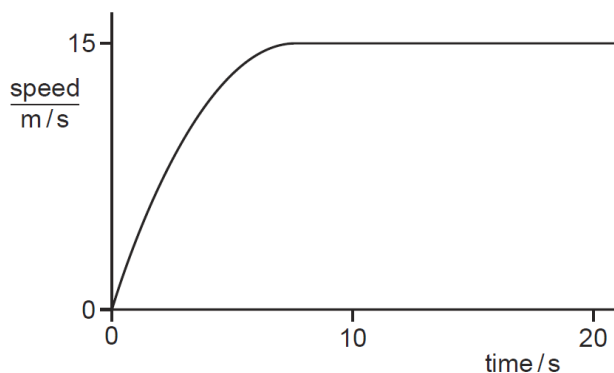
What happens to the acceleration and what happens to the velocity of the car during the journey?

- A Both the acceleration and the velocity change.
- B Only the acceleration changes.
- C Only the velocity changes.
- D Neither the acceleration nor the velocity changes.

Graphical analysis of motion

QUESTION # 1:

- 4 The graph shows how the speed of a car varies with time.

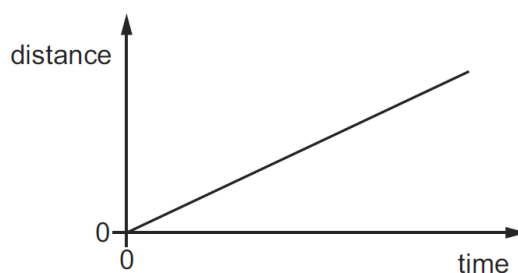


Which statement about the acceleration of the car between 10 s and 20 s is correct?

- A The acceleration decreases.
- B The acceleration increases.
- C The acceleration is constant, but not zero.
- D The acceleration is zero.

QUESTION # 2:

- 4 The diagram shows the distance-time graph of a car.



The car is travelling along a straight road up a hill.

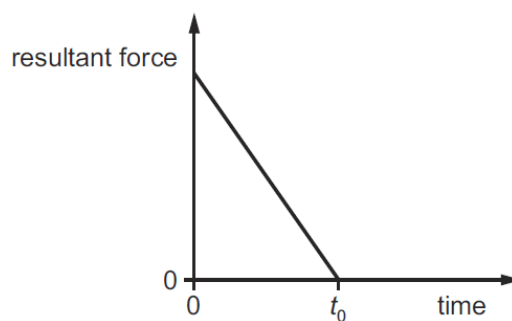
Which quantity for the car is constant and greater than zero?

- A acceleration
- B gravitational potential energy
- C kinetic energy
- D resultant force

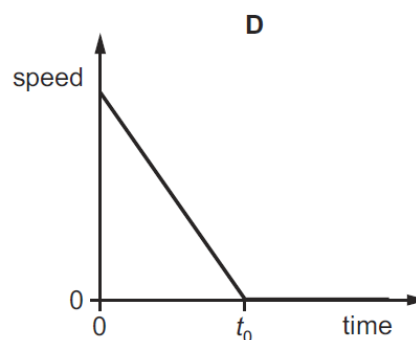
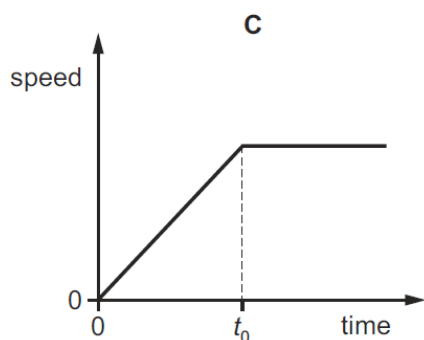
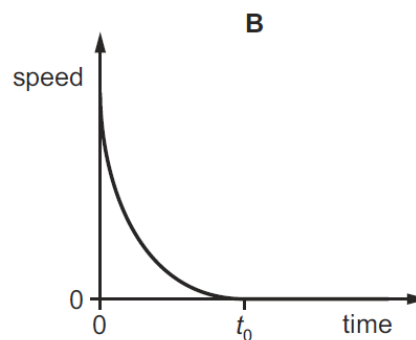
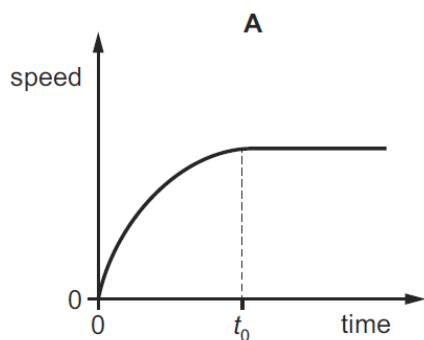
QUESTION # 3

- 5 A resultant force acts on an object and causes it to move in a straight line.

The graph shows how the resultant force varies with time.

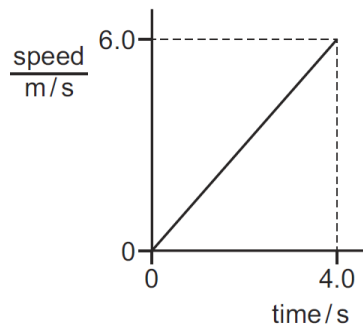


Which graph is the speed-time graph for the object?



QUESTION # 4

- 5 The diagram shows a speed-time graph for an object moving with uniform acceleration.

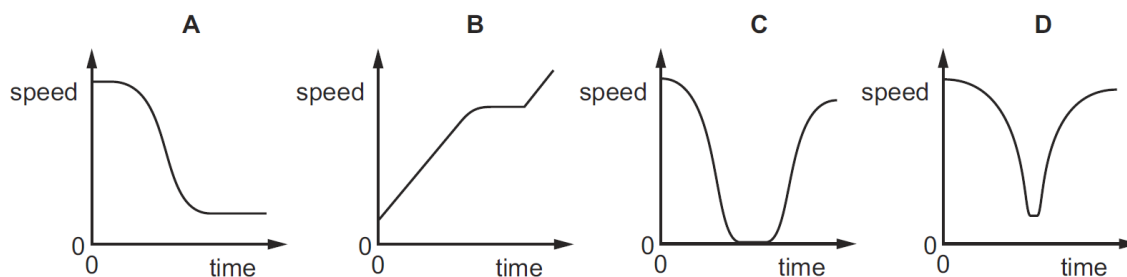


What is the distance travelled in the first 4.0 s?

- A** 0.67 m **B** 1.5 m **C** 12 m **D** 24 m

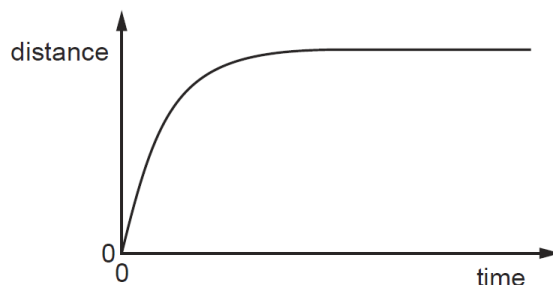
QUESTION # 5

- 4 Which speed-time graph represents the motion of a railway train making a short stop at a station?



QUESTION # 6

- 4 The diagram shows the distance–time graph for a moving object.

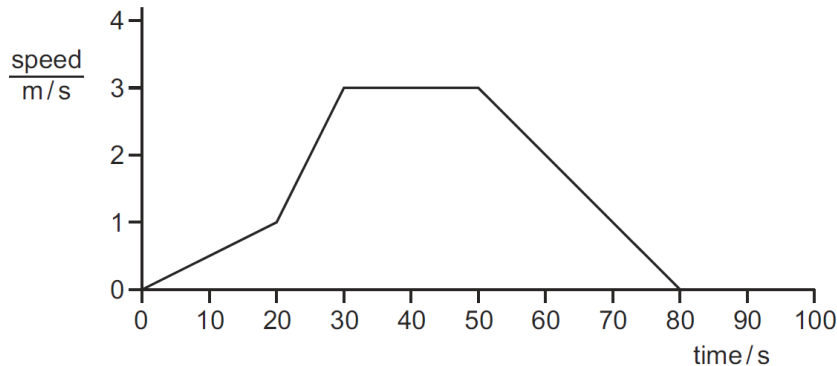


What is the moving object?

- A a ball thrown vertically upwards and falling back to the thrower
- B a car, starting from rest, speeding up as it moves away from a traffic signal
- C a rock dropped from a high cliff, falling into the sea below
- D a train braking to a halt as it stops at a station

QUESTION # 7

- 3 The graph shows a short journey. It is a speed–time graph.

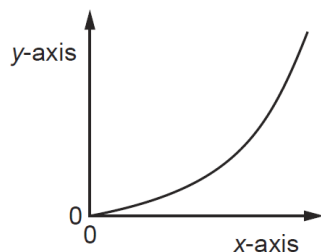


What is the greatest speed reached?

- A 1 m/s B 2 m/s C 3 m/s D 4 m/s

QUESTION # 8

- 4 A car has stopped at a red light. When the light changes to green, the car starts moving with a constant acceleration. The graph represents this motion.



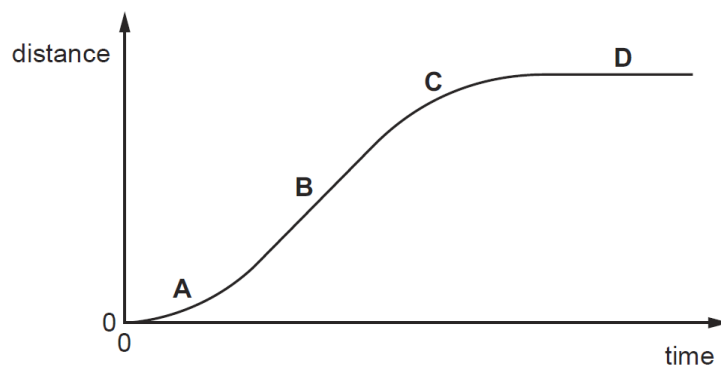
Which quantity is plotted on the x-axis and which quantity is plotted on the y-axis?

	x-axis	y-axis
A	distance	time
B	speed	time
C	time	distance
D	time	speed

QUESTION # 9

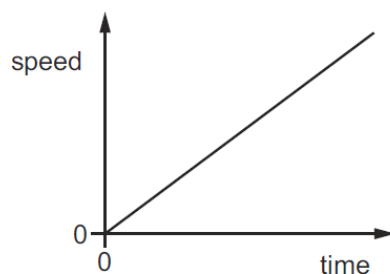
- 4 The graph shows a distance-time graph for a car travelling in a straight line.

In which region is the car decelerating?

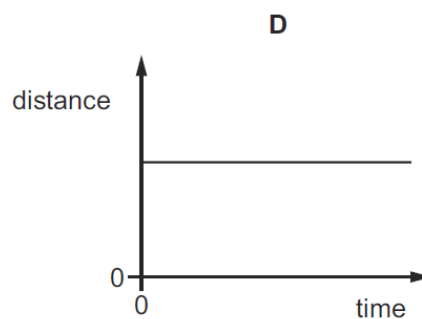
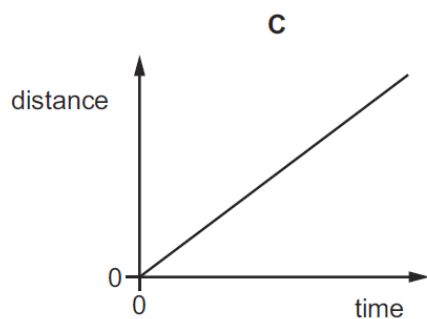
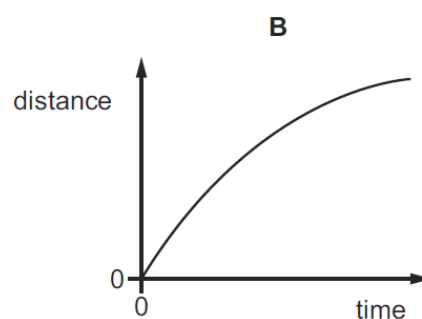
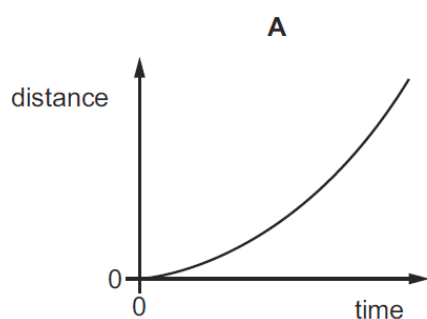


QUESTION # 10

- 3 The speed-time graph represents a short journey.

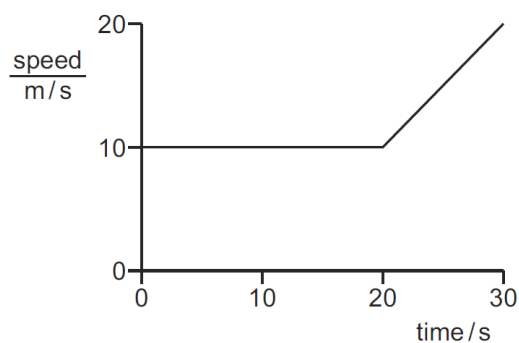


Which distance-time graph represents the same journey?



QUESTION # 11

- 4 An object travels for 20 s with a constant speed of 10 m/s. For the next 10 s, it accelerates uniformly to 20 m/s.



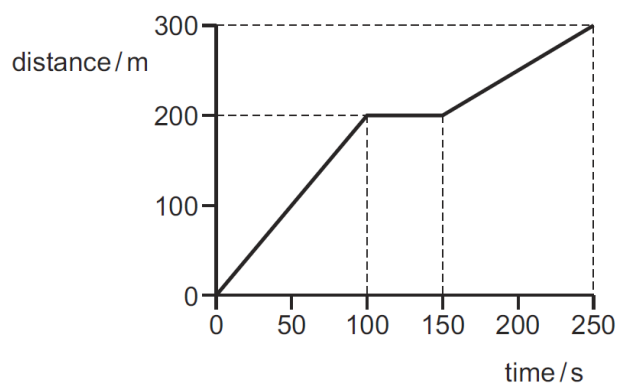
What is the total distance travelled by the object in the 30 s?

- A 300 m B 350 m C 400 m D 450 m

QUESTION # 12

- 4 A cyclist takes a ride lasting 250 s.

The graph shows how the distance from the starting position varies with time.

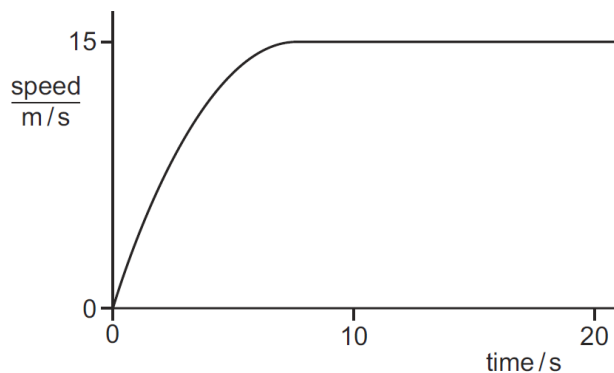


What is his average speed for the whole journey?

- A 1.0 m/s B 1.2 m/s C 1.5 m/s D 2.0 m/s

QUESTION # 13

- 5 The graph shows how the speed of a car varies with time.

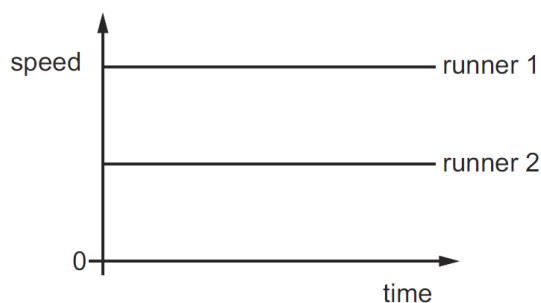


Which statement about the acceleration of the car between the times 10 s and 20 s is correct?

- A The acceleration decreases.
- B The acceleration increases.
- C The acceleration is constant, but not zero.
- D The acceleration is zero.

QUESTION # 14

- 5 Part of a speed–time graph for two runners is shown. They are running along the same track.



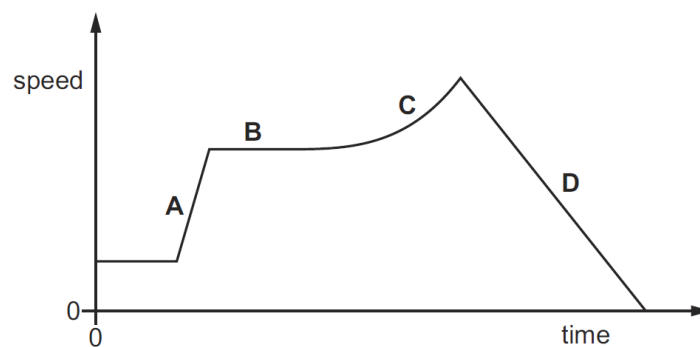
Which statement **must** be correct?

- A Both runners started at the same moment.
- B Runner 1 has a greater acceleration than runner 2.
- C Runner 1 is moving faster than runner 2.
- D The distance between the two runners stays constant.

QUESTION # 15

3 The speed–time graph for a car's journey is shown.

During which part of the journey is the car moving with non-uniform acceleration?



Free-fall

QUESTION # 1:

- 6 A skydiver jumps from an aeroplane. After a few seconds, he reaches a terminal velocity without opening his parachute.

Why does he reach terminal velocity?

- A Air resistance becomes greater than his weight and slows him down.
- B Air resistance decreases and he speeds up.
- C Air resistance increases and balances his weight so that his acceleration is zero.
- D His weight decreases and balances the air resistance.

QUESTION # 2:

- 6 Which forces act on a skydiver who is falling at terminal velocity?

- A air resistance and weight
- B air resistance only
- C weight only
- D no forces act

QUESTION # 3

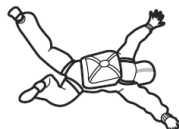
- 6 At time t_1 , a stone is dropped from a stationary balloon. The stone reaches terminal velocity at time t_2 .

Which row gives the acceleration of the stone at time t_1 and at time t_2 ?

	<u>acceleration at t_1</u> m/s^2	<u>acceleration at t_2</u> m/s^2
A	0	0
B	10	0
C	0	10
D	10	10

QUESTION # 4

- 2 A skydiver falls from rest through the air and reaches terminal velocity.



What is the acceleration of the skydiver during his fall?

- A constant at 0 m/s^2
- B constant at 10 m/s^2
- C starting at 0 m/s^2 and increasing to 10 m/s^2
- D starting at 10 m/s^2 and decreasing to 0 m/s^2

QUESTION # 5

- 3 Two aluminium spheres P and Q, of masses 0.50 kg and 1.0 kg respectively, are released at the same time from the same height.

Why do they have the same acceleration?

- A The density of P is equal to the density of Q.
- B The force on P is equal to the force on Q.
- C The force on Q is double the force on P.
- D The gravitational field strength for Q is double that for P.

QUESTION # 6

- 5 A skydiver falls at terminal velocity. He then opens his parachute.

Which row gives the direction of the resultant force on the skydiver and the direction of the acceleration of the skydiver immediately after the parachute opens?

	resultant force	acceleration
A	downwards	downwards
B	downwards	upwards
C	upwards	downwards
D	upwards	upwards

QUESTION # 7

- 4 A free-fall skydiver jumps from a plane. As he falls there is a force acting upwards and a force acting downwards on his body. These produce a resultant force.

Before he reaches terminal velocity, how do the sizes of the forces change?

	downward force	upward force	resultant force
A	decreases	decreases	stays the same
B	increases	stays the same	decreases
C	stays the same	increases	decreases
D	stays the same	increases	increases

QUESTION # 8

- 3 A skydiver is falling at terminal velocity.



Which row describes the acceleration of the skydiver and the velocity of the skydiver?

	acceleration of the skydiver	velocity of the skydiver
A	downwards	constant
B	downwards	zero
C	zero	constant
D	zero	zero

QUESTION # 9

- 1 An apple falls from a tree.

Which row describes the forces acting on the apple and the motion of the apple as it falls?

	forces acting on the apple	motion of the apple
A	balanced	acceleration
B	balanced	constant speed
C	unbalanced	acceleration
D	unbalanced	constant speed

QUESTION # 10

- 10 There is no atmosphere on the Moon.

Two metal spheres of identical volume but different mass are at rest at the same height above the ground on the Moon. They are dropped at the same time.

How do the spheres move after release?

- A** The sphere with the larger mass has a smaller acceleration.
- B** The sphere with the larger mass hits the ground first.
- C** The sphere with the smaller mass has a smaller acceleration.
- D** The two spheres hit the ground together.

QUESTION # 11

- 7 In which descent is the acceleration equal to the acceleration of free fall g at all times?
- A** a bungee jumper leaping from a bridge
 - B** a feather falling in a vertical tube that contains a vacuum
 - C** a hailstone travelling to Earth at terminal velocity
 - D** a sky-diver dropping from an aircraft towards the ground

QUESTION # 12

- 4 A parachutist falling at a steady speed opens her parachute.

Which row is correct for the direction of the resultant force and for the direction of the acceleration of the parachutist just after her parachute opens?

	resultant force direction	acceleration direction
A	downwards	downwards
B	downwards	upwards
C	upwards	downwards
D	upwards	upwards