Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic : 2 (Mechanics)

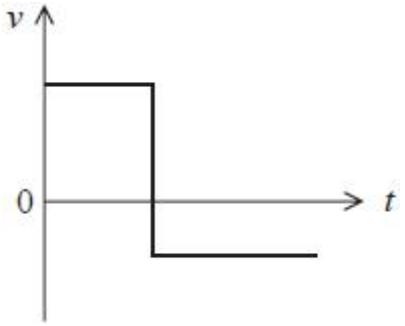
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Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

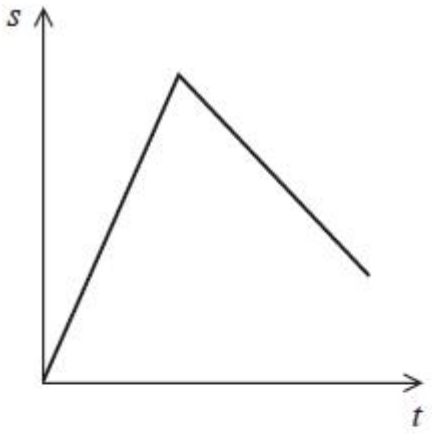
Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

A simplified velocity-time graph for the flight of a drone is shown.

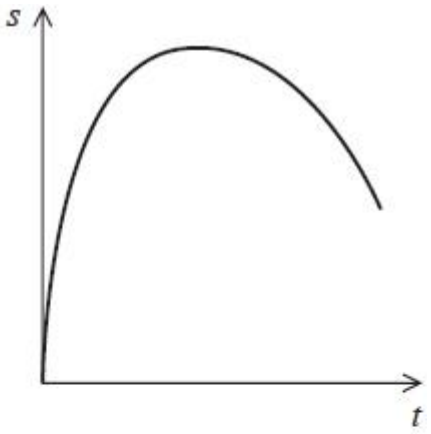


Which of the following is a displacement-time graph for the same flight?

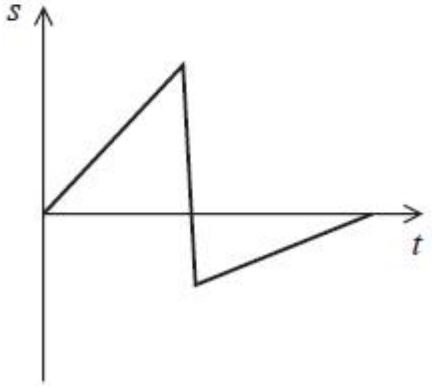
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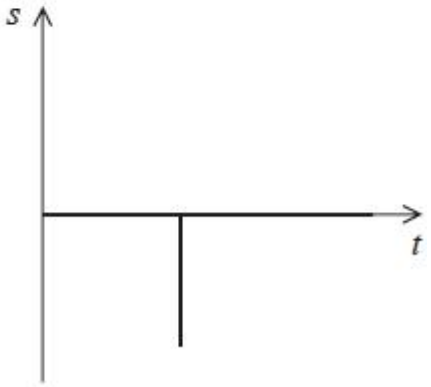
A



B



C



D

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(Total for question = 1 mark)

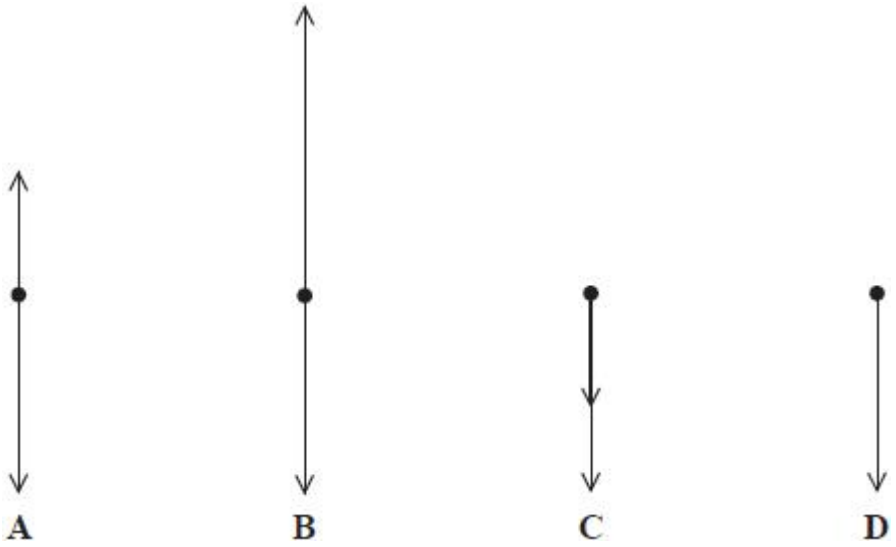
Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A student throws a ball vertically upwards.

Which of the following shows a free-body force diagram for the ball immediately after it leaves the student's hand?

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☒ **A**

☒ **B**

☒ **C**

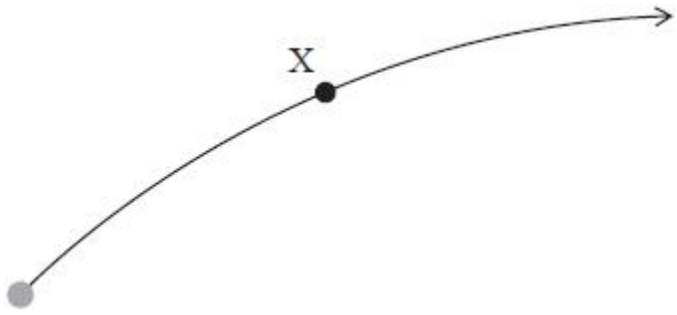
☒ **D**

(Total for question = 1 mark)

Q3.

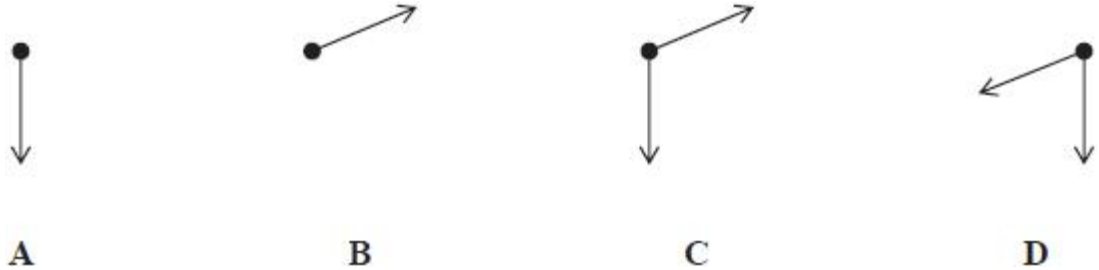
Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

A ball is thrown and follows the path shown.



Air resistance is negligible.

Which of the following is a free-body force diagram for the ball at position X?



☒ **A**

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☒ **B**

☒ **C**

☒ **D**

(Total for question = 1 mark)

Q4.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Which of the following quantities is a vector?

☒ **A** charge

☒ **B** mass

☒ **C** momentum

☒ **D** time

(Total for question = 1 mark)

Q5.

The mass of a rocket including fuel at take-off is 11 000 kg. The engines produce an upwards vertical thrust of 150 000 N.

The acceleration, in m s^{-2}, of the rocket at take-off is found using

☒ **A** $\frac{150\,000}{11\,000}$

☒ **B** $\frac{150\,000 - 11\,000}{11\,000}$

☒ **C** $\frac{150\,000 - (11\,000 \times 9.81)}{11\,000}$

☒ **D** $\frac{150\,000 - (11\,000 \times 9.81)}{(11\,000 \times 9.81)}$

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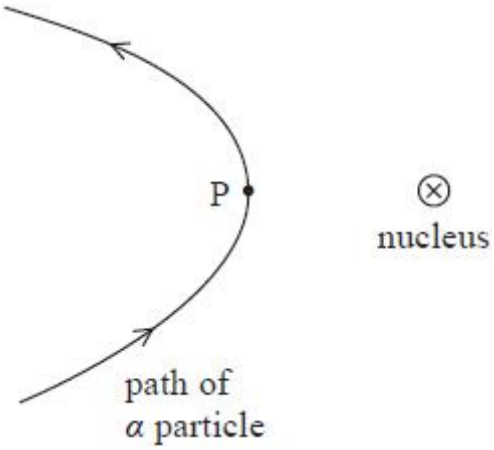
(Total for question = 1 mark)

Q6.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Alpha particle scattering investigations were first carried out in the early part of the 20th century.

The diagram shows the path of an *α* particle that is being deflected by the nucleus of a gold atom. The closest distance of approach of the *α* particle to the nucleus is at point P.



Which row in the table describes the speed and potential energy of the *α* particle at point P on this path?

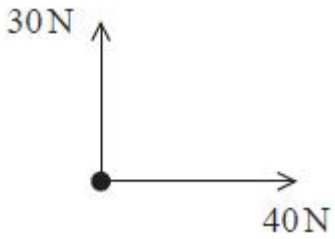
		Speed at P	Potential energy at P
☒	**A**	greatest	greatest
☒	**B**	greatest	least
☒	**C**	least	greatest
☒	**D**	least	least

(Total for question = 1 mark)

Q7.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The diagram shows the two forces acting on a point mass.



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The mass accelerates.

Which of the following gives the angle between the direction of the acceleration and the 40 N force?

☒ **A** $\cos^{-1}$ (30/40)

☒ **B** $\sin^{-1}$ (40/50)

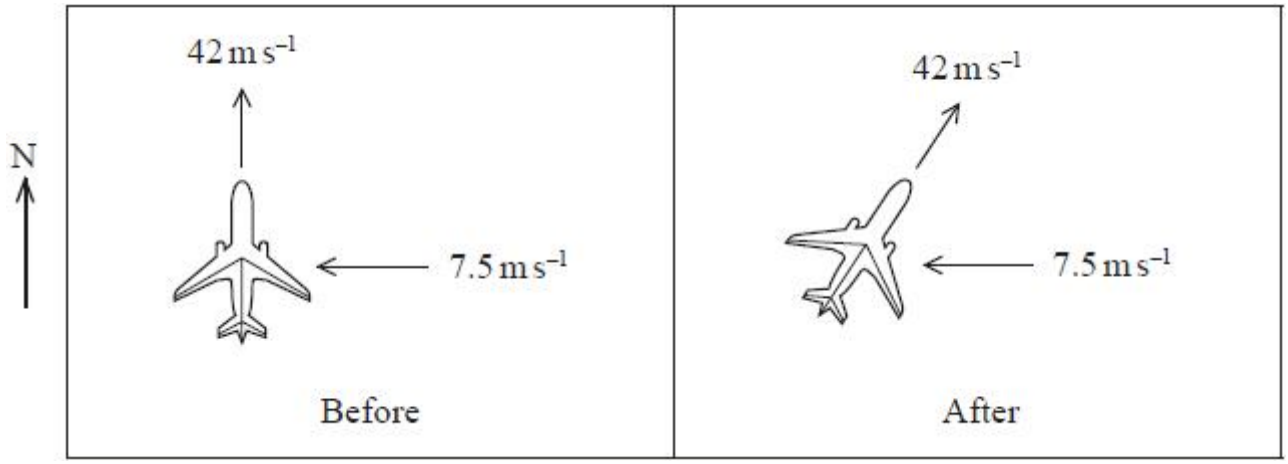
☒ **C** $\tan^{-1}$ (30/40)

☒ **D** $\tan^{-1}$ (40/50)

(Total for question = 1 mark)

Q8.

A plane is travelling north at 42 m s^{-1}. It enters a region with a wind blowing from the east at 7.5 m s^{-1}. To keep travelling north, the plane turns towards the east, without changing the thrust, as shown.



Which of the following could be used to calculate the angle through which the plane turns?

☒ **A** $\cos^{-1}\left(\frac{42}{7.5}\right)$

☒ **B** $\sin^{-1}\left(\frac{7.5}{42}\right)$

☒ **C** $\tan^{-1}\left(\frac{7.5}{42}\right)$

☒ **D** $\tan^{-1}\left(\frac{42}{7.5}\right)$

(Total for question = 1 mark)

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Q9.

An object is acted on by a vertical force of 25 N and a horizontal force of 34 N.

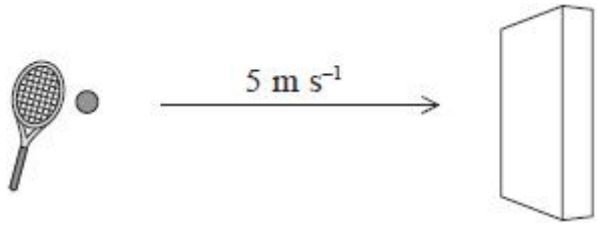
The angle to the horizontal of the resultant force is given by

- ☒ **A** $\cos^{-1}$ (25/34)
- ☒ **B** $\sin^{-1}$ (34/25)
- ☒ **C** $\tan^{-1}$ (25/34)
- ☒ **D** $\tan^{-1}$ (34/25)

(Total for question = 1 mark)

Q10.

A tennis ball of mass 0.06kg moves towards a wall at a velocity of 5 m s^{-1} as shown.



The tennis ball hits the wall perpendicularly and rebounds at the same speed.

What is the change in momentum of the ball?

(1)

- ☒ **A** 0.60kg m s^{-1}
- ☒ **B** 0.30kg m s^{-1}
- ☒ **C** −0.30kg m s^{-1}
- ☒ **D** −0.60kg m s^{-1}

(Total for question = 1 mark)

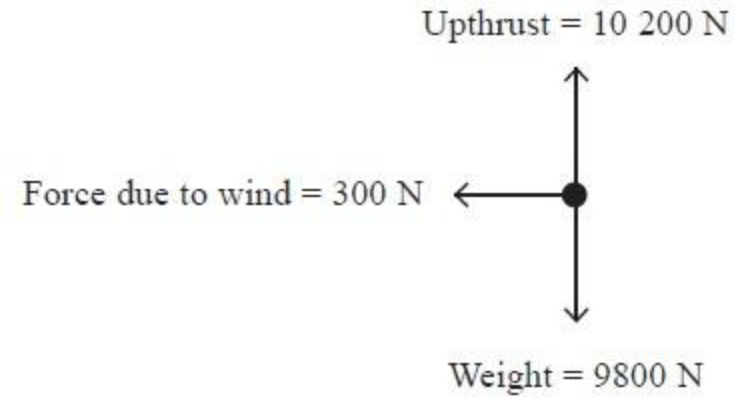
Q11.

The diagram shows the forces acting on a hot air balloon when at a constant height.

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Below is a free-body force diagram for the balloon when a wind is blowing.



The magnitude of the resultant force acting on the balloon is

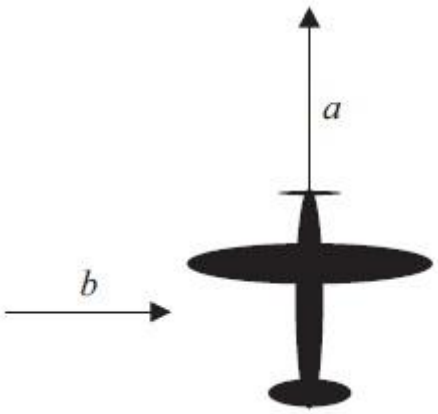
- **A** 400 N
- **B** 500 N
- **C** 700 N
- **D** 9 805 N

(Total for Question = 1 mark)

Q12.

An aeroplane is flying horizontally and heading north through the air. Its speed through the air is a and the wind is blowing east with a speed b.

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The speed over the ground is given by

- ☒ **A** $a + b$
- ☒ **B** $a^2 + b^2$
- ☒ **C**
- ☒ **D** $\sqrt{a^2 + b^2}$

(Total for question = 1 marks)

Q13.

A student is deriving an equation for the total resistance of resistors in series.

She writes the following steps but does not justify them.

Step 1 $V = V_1 + V_2$

Step 2 $but\ V = IR$

Step 3 $so\ IR = I_1R_1 + I_2R_2$

Step 4 $but\ I = I_1 = I_2$

Step 5 $Therefore\ R = R_1 + R_2$

Which step is justified using conservation of charge?

(1)

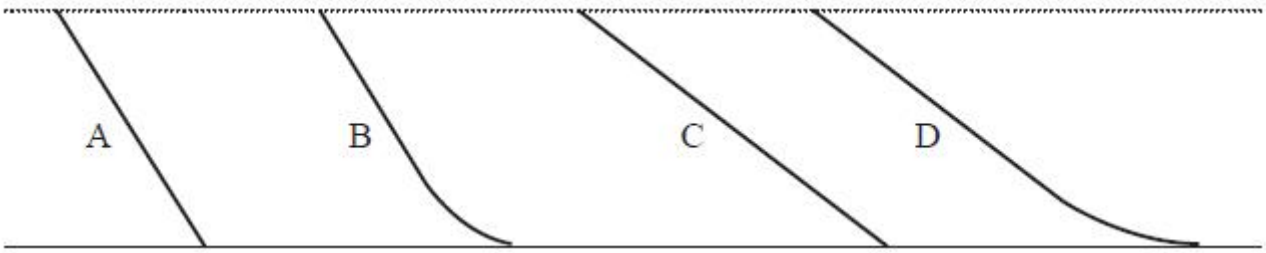
- ☒ **A** Step 1
- ☒ **B** Step 2
- ☒ **C** Step 3
- ☒ **D** Step 4

(Total for question = 1 mark)

Q14.

A child slides down four frictionless slides A, B, C and D.

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The speed of the child at the bottom of slides A, B, C and D is given by v_A, v_B, v_C and v_D respectively.

Choose the correct statement.

- ☒ **A** $v_A = v_B = v_C = v_D$
- ☒ **B** $v_A > v_B$ and $v_C > v_D$
- ☒ **C** $v_A > v_B > v_C = v_D$
- ☒ **D** $v_A > v_C$ and $v_B > v_D$

(Total for question = 1 mark)

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Q15.

A car of mass *m* travelling with a velocity *v* comes to rest over a distance *d* in time *t*.

The constant frictional force acting on the car while it is braking is found using

☒ **A** $\frac{mv}{2t}$

☒ **B** $\frac{2mv}{t}$

☒ **C** $\frac{mv^2}{2d}$

☒ **D** $\frac{2mv^2}{d}$

(Total for question = 1 mark)

Q16.

A body, initially at rest, explodes into two masses M_1 and M_2. These masses move apart with speeds v_1 and v_2 respectively.
The ratio v_1/v_2 is equal to

A $\frac{\sqrt{M_1}}{\sqrt{M_2}}$ $\frac{M_1}{M_2}$

B $\frac{\sqrt{M_1}}{\sqrt{M_2}}$ $\frac{M_2}{M_1}$

C $\frac{\sqrt{M_1}}{\sqrt{M_2}}$

D $\frac{\sqrt{M_1}}{\sqrt{M_2}}$ $\frac{\sqrt{M_2}}{\sqrt{M_1}}$

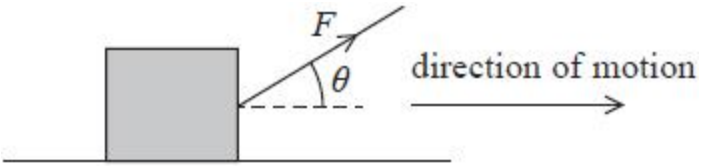
(Total for question = 1 mark)

Q17.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A rope is used to apply a force *F* to a box as shown. The box is pulled a distance *d* along a horizontal surface.

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Which of the following could be used to determine the work done on the box?

☒ **A** $Fd \sin \theta$

☒ **B** $\frac{Fd}{\sin \theta}$

☒ **C** $Fd \cos \theta$

☒ **D** $\frac{Fd}{\cos \theta}$

(Total for question = 1 mark)

Q18.

The correct definition of the term centre of gravity is the point at which

☒ **A** all of the force acts on a body.

☒ **B** gravity acts on a body.

☒ **C** the weight of a body may be considered to act.

☒ **D** the weight is concentrated.

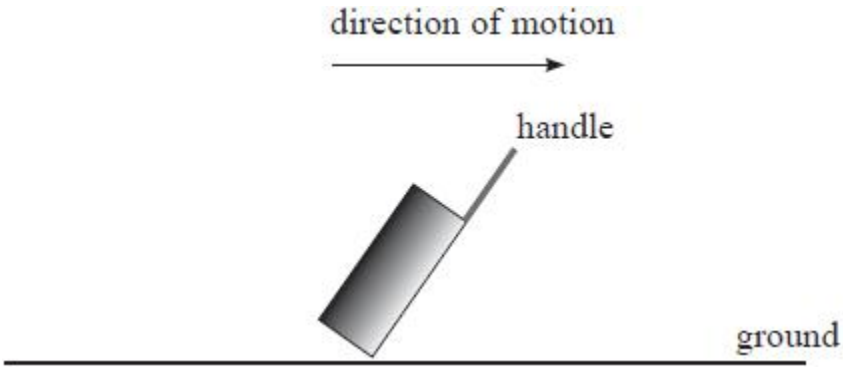
(Total for question = 1 mark)

Q19.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

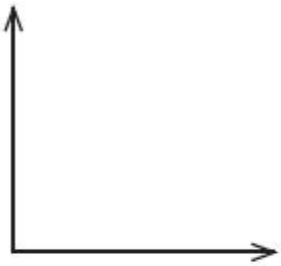
A suitcase is being dragged along the ground by the handle in the direction shown.

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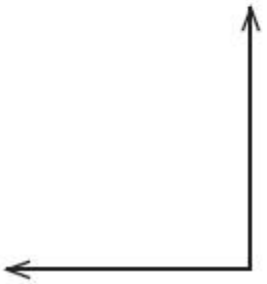


Which of the following shows the direction of the horizontal and vertical components of force acting on the ground due to the suitcase?

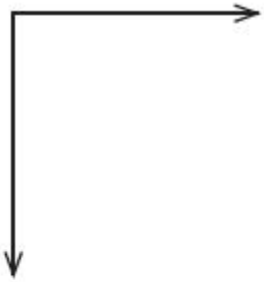
☒ **A**



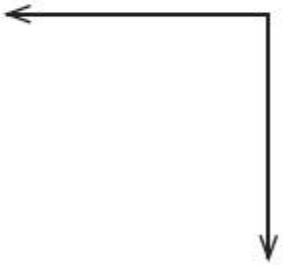
☒ **B**



☒ **C**



☒ **D**



(Total for question = 1 mark)

Q20.

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The angle from north at which the plane flies over the ground is given by

- ☒ **A** $\cos^{-1} \alpha/b$
- ☒ **B** $\sin^{-1} b/\alpha$
- ☒ **C** $\tan^{-1} \alpha/b$
- ☒ **D** $\sin^{-1} b/\alpha$

(Total for question = 1 marks)

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