3D Coordinate Geometry: exam practice

10 questions · 28 marks · worked solutions and markschemes

Name _____ Date _____ Score / 28

- Answer every question before you look at the solutions. They start after the last question, with the marks for each line: M for method, A for accuracy, R for reasoning.
- Online, with more practice: ibmathrevision.com/hlai/3d-coordinate-geometry-exam-practice

1. **3 marks · Paper 1 style · calculator allowed**

A is $(3, -1, 4)$ and B is $(7, 5, -2)$.

Find the midpoint of AB and the distance AB. **[3]**

2. **2 marks · Paper 1 style · calculator allowed**

The midpoint of PQ is $M(2, 0, -3)$ and P is $(-1, 4, 1)$.

Find the coordinates of Q. **[2]**

3. **2 marks · Paper 2 style · calculator allowed**

A room is a cuboid 6 m long, 4 m wide and 3 m high. A spider is at one bottom corner, at the origin, and a fly at the opposite top corner $(6, 4, 3)$.

Find the straight-line distance between them. **[2]**

4. **2 marks · Paper 2 style · calculator allowed**

Two aircraft are at $(12, -5, 8)$ and $(20, 4, 9.5)$, with distances in km.

Find the distance between them. **[2]**

5. **2 marks · Paper 1 style · calculator allowed**

$A(0, 0, 0)$, $B(4, 0, 0)$, $C(4, 3, 0)$ and $D(4, 3, 12)$.

Find the length AD. **[2]**

6. **3 marks · Paper 1 style · calculator allowed**

The point $(k, 2, 5)$ is $\sqrt{30}$ units from $(1, 0, 0)$.

Find the possible values of k. **[3]**

7. **3 marks · Paper 1 style · calculator allowed**

The points $(2, a, 1)$ and $(a, 3, 4)$ are $\sqrt{14}$ units apart.

Find a. **[3]**

8. **3 marks · Paper 2 style · calculator allowed**

A tent pole stands at $(0, 0, 0)$ to $(0, 0, 2.5)$. Guy ropes run from the top to pegs at $(1.8, 0, 0)$ and $(-1.2, 1.6, 0)$.

Find the total length of the two ropes. **[3]**

9. **4 marks · Paper 2 style · calculator allowed**

A drone flies from the origin to $(120, 80, 45)$, in metres.

Find the distance flown and the angle of elevation of the drone from the origin. **[4]**

10. **4 marks · Paper 1 style · calculator allowed**

$A(1, 2, 3)$, $B(4, 6, 3)$ and $C(1, 2, 8)$.

Show that triangle ABC is right-angled and find its area. **[4]**

Answers and worked solutions

Question 1 — 3 marks

Answer: $(5, 2, 1)$; 9.38

$(5, 2, 1)$ **A1**

$\sqrt{16 + 36 + 36}$ **M1**

9.38 **A1**

Question 2 — 2 marks

Answer: $(5, -4, -7)$

$Q = 2M - P$ **M1**

$(5, -4, -7)$ **A1**

Question 3 — 2 marks

Answer: $7.81\ m$

$\sqrt{36 + 16 + 9}$ **M1**

$7.81\ m$ **A1**

Question 4 — 2 marks

Answer: 12.1 km

$\sqrt{8^2 + 9^2 + 1.5^2}$ **M1**

12.1 km **A1**

Question 5 — 2 marks

Answer: 13

$\sqrt{16 + 9 + 144}$ **M1**

13 **A1**

Question 6 — 3 marks

Answer: $k = 0,\ k = 2$

$(k - 1)^2 + 4 + 25 = 30$ **M1**

$(k - 1)^2 = 1$ **A1**

$k = 0,\ k = 2$ **A1**

Question 7 — 3 marks

Answer: $a = 1,\ a = 4$

$(a - 2)^2 + (3 - a)^2 + 9 = 14$ **M1**

$2a^2 - 10a + 8 = 0$ **A1**

$a = 1,\ a = 4$ **A1**

Question 8 — 3 marks

Answer: $6.28\ m$

$\sqrt{1.8^2 + 2.5^2} = 3.08$ **A1**

$\sqrt{1.2^2 + 1.6^2 + 2.5^2} = 3.20$ **A1**

$6.28\ m$ **A1**

Question 9 — 4 marks

Answer: $151\ m$; $17.3°$

$\sqrt{120^2 + 80^2 + 45^2}$ **M1**

$151\ m$ **A1**

horizontal distance 144.2 **M1**

$17.3°$ **A1**

Question 10 — 4 marks

Answer: 12.5

$AB = 5,\ AC = 5,\ BC = \sqrt{50}$ **A1**

$AB^2 + AC^2 = BC^2$ **R1**

area $\frac{1}{2}(5)(5)$ **M1**

12.5 **A1**

Every solution is also on ibmathrevision.com/hlai/3d-coordinate-geometry-exam-practice
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