IB MATHS AA HL · UNIT 3

Geometry and Right Angled Trigonometry: exam practice

10 questions · 43 marks · worked solutions and markschemes

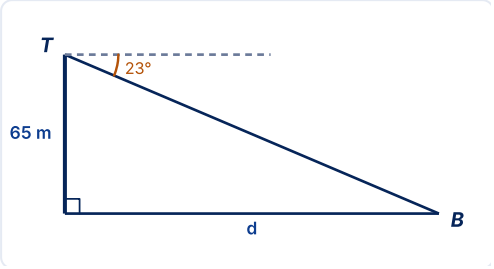
Name _____ Date _____ Score / 43

- 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/hlaa/geometry-and-right-angled-trigonometry-exam-practice

1. **3 marks · Paper 2 style · calculator**

From the top of a cliff 65 m high, the angle of depression of a boat is $23°$.

Find the horizontal distance from the foot of the cliff to the boat. **[3]**



Cliff 65 m, angle of depression 23°

2. **4 marks · Paper 1 style · no calculator**

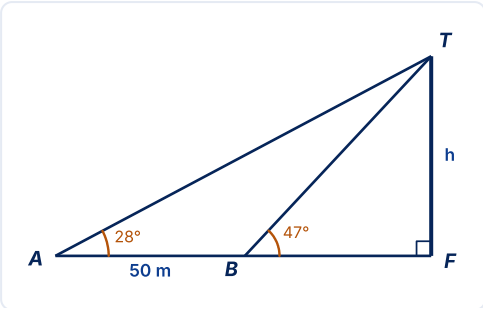
The point $P(k, 2, -1)$ is 7 units from $Q(3, -4, 1)$.

Find the possible values of k. **[4]**

3. **5 marks · Paper 2 style · calculator**

From a point A on level ground the angle of elevation of the top of a mast is $28°$. From B, 50 m closer to the mast, the angle of elevation is $47°$.

Find the height of the mast. **[5]**



Angles of elevation 28° and 47°, 50 m apart

4. **4 marks · Paper 1 style · no calculator**

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

(a) Find the midpoint of AB. **[2]**

(b) Find the distance AB. **[2]**

5. **3 marks · Paper 1 style · no calculator**

In the right-angled triangle ABC, $A\hat{B}C = 90°$, $AB = 8$ cm and $AC = 17$ cm.

(a) Find BC. **[2]**

(b) Write down the exact value of $\tan B\hat{A}C$. **[1]**

6. **3 marks · Paper 1 style · no calculator**

A ladder 6 m long leans against a vertical wall. The foot of the ladder is 2 m from the wall.

(a) Find the exact height the ladder reaches up the wall. **[2]**

(b) Find the exact value of the cosine of the angle the ladder makes with the ground. **[1]**

7. **5 marks · Paper 2 style · calculator**

A right pyramid has a square base of side 10 cm and a vertical height of 12 cm.

(a) Find the volume. **[2]**

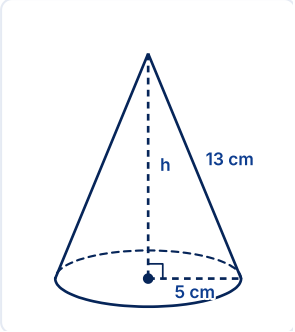
(b) Find the angle between a sloping face and the base. **[3]**

8. **5 marks · Paper 2 style · calculator**

A cone has base radius 5 cm and slant height 13 cm.

(a) Find the height of the cone. **[2]**

(b) Find the volume and the curved surface area of the cone. **[3]**



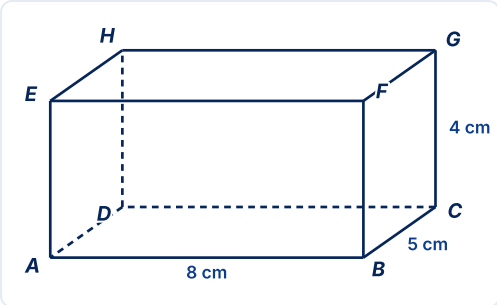
Radius 5 cm, slant height 13 cm

9. **5 marks · Paper 2 style · calculator**

The cuboid $ABCDEFGH$ has $AB = 8$ cm, $BC = 5$ cm and $CG = 4$ cm, where G is vertically above C.

(a) Find the length AG. **[2]**

(b) Find the angle between AG and the base $ABCD$. **[3]**



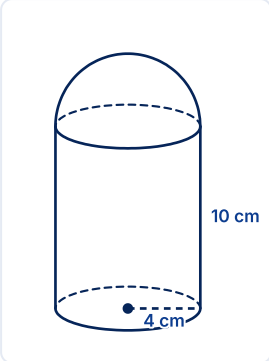
Cuboid 8 cm by 5 cm by 4 cm

10. **6 marks · Paper 2 style · calculator**

A solid consists of a cylinder of radius 4 cm and height 10 cm with a hemisphere of radius 4 cm on top.

(a) Find the volume of the solid. **[3]**

(b) Find the total surface area of the solid. **[3]**



Cylinder 4 cm by 10 cm with a hemisphere on top

Answers and worked solutions

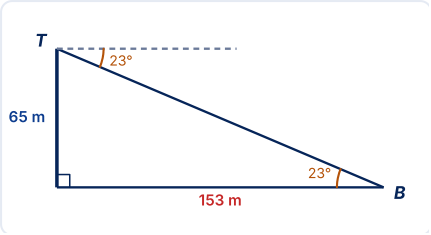
Question 1

3 marks

Answer: $153\,m$

$\tan 23° = \dfrac{65}{d}$ $M1A1$

$d = 153\,m$ A1



Alternate angles: $23°$ at B, so $d = 153$ m

Question 2

4 marks

Answer: $k = 0$, $k = 6$

$(k-3)^2 + 36 + 4 = 49$ $M1A1$

$(k-3)^2 = 9$ A1

$k = 0$ or $k = 6$ A1

Question 3

5 marks

Answer: $52.7\,m$

$h = d\tan 47°$ and

$h = (d + 50)\tan 28°$ $M1A1$

$d = \dfrac{50\tan 28°}{\tan 47° - \tan 28°}$ A1

$d = 49.2$ A1

$h = 52.7\,m$ A1

Question 4

4 marks

Answer: (a) $(-1, 1, 3)$; (b) $2\sqrt{17}$

(a)

$\left(\dfrac{2-4}{2}, \dfrac{-1+3}{2}, \dfrac{5+1}{2}\right)$ M1

$(-1, 1, 3)$ A1

(b)

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

$2\sqrt{17}$ A1

Question 5

3 marks

Answer: (a) 15; (b) $\frac{15}{8}$

(a)

$\sqrt{17^2 - 8^2}$ M1

15 cm A1

(b)

$\dfrac{15}{8}$ A1

Question 6

3 marks

Answer: (a) $4\sqrt{2}\,m$; (b) $\frac{1}{3}$

(a)

$\sqrt{36 - 4}$ M1

$4\sqrt{2}\,m$ A1

(b)

$\dfrac{1}{3}$ A1

Question 7

5 marks

Answer: (a) 400 cm^3; (b) $67.4°$

(a)

$\dfrac{1}{3}(100)(12)$ M1

400 cm^3 A1

(b)

from the centre to the midpoint of a side: 5 cm A1

$\tan\theta = \dfrac{12}{5}$ M1

$67.4°$ A1

Question 8

5 marks

Answer: (a) 12; (b) 314 cm^3, 204 cm^2

(a)

$\sqrt{13^2 - 5^2}$ M1

12 cm A1

(b)

$V = \dfrac{1}{3}\pi(25)(12) = 314\text{ cm}^3$ $M1$ A1

curved area $\pi(5)(13) = 204\text{ cm}^2$ A1

Question 9

5 marks

Answer: (a) 10.2 cm; (b) $23.0°$

(a)

$\sqrt{8^2 + 5^2 + 4^2}$ M1

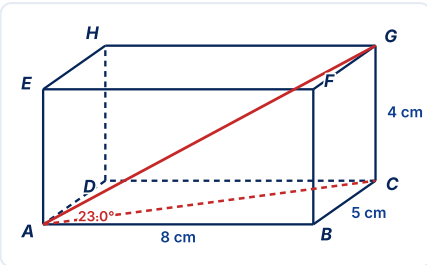
10.2 cm A1

(b)

$AC = \sqrt{89}$ A1

$\tan\theta = \dfrac{4}{\sqrt{89}}$ M1

$23.0°$ A1



Angle $GAC = 23.0°$

Question 10

6 marks

Answer: (a) 637 cm^3; (b) 402 cm^2

(a)

$\pi(4^2)(10) + \dfrac{2}{3}\pi(4^3)$ $M1A1$

637 cm^3 A1

(b)

$\pi(4^2) + 2\pi(4)(10) + 2\pi(4^2)$ $M1$ A1

402 cm^2 A1

Every solution is also on ibmathrevision.com/hlaa/geometry-and-right-angled-trigonometry-exam-practice
Our own original questions, written and checked by IB Math Revision. IB Math Revision is independent and is not affiliated with, endorsed by or connected to the International Baccalaureate Organization. This work/product/service has been developed independently from and is not endorsed by the International Baccalaureate Organization. International Baccalaureate, Baccalauréat International, Bachillerato Internacional and IB are registered trademarks owned by the International Baccalaureate Organization.