

Triangles Review Packet

1. The height of a vertical cliff is 450 m. The angle of elevation from a ship to the top of the cliff is 23° . The ship is x metres from the bottom of the cliff.

- (a) Draw a diagram to show this information.

Diagram:

- (b) Calculate the value of x .

Working:

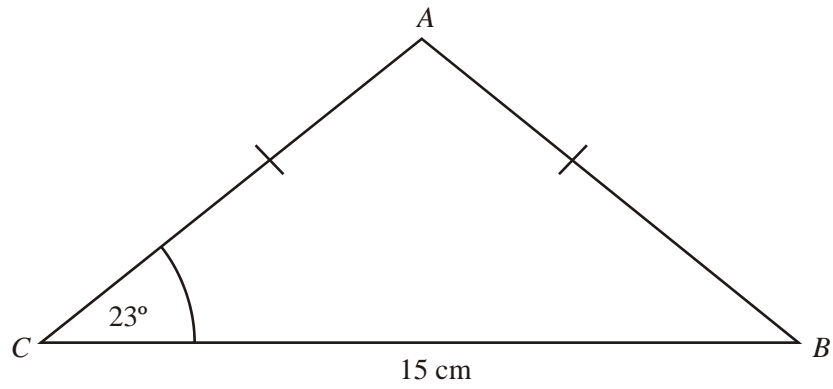
Answer:

(b)

(Total 4 marks)

2. In the diagram, triangle ABC is isosceles. $AB = AC$, $CB = 15$ cm and angle ACB is 23° .

Diagram not to scale



Find

- (a) the size of angle CAB ;
- (b) the length of AB .

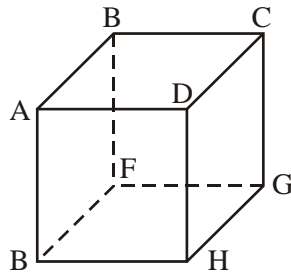
Working:

Answers:

- (a)
- (b)

(Total 4 marks)

3. The following diagram shows a carton in the shape of a cube 8 cm long on each side:



- (a) The longest rod that will fit on the bottom of the carton would go from E to G. Find the length l of this rod.
- (b) Find the length L of the longest rod that would fit inside the carton.

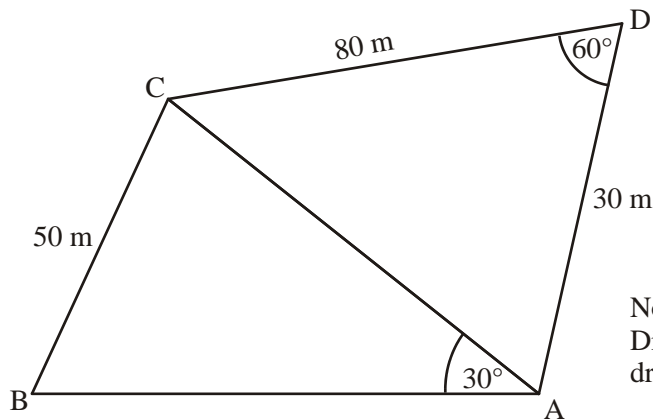
Working:

Answers:

- (a)
- (b)

(Total 4 marks)

4. The figure shows two adjacent triangular fields ABC and ACD where $AD = 30$ m, $CD = 80$ m, $BC = 50$ m. $\hat{A}DC = 60^\circ$ and $\hat{B}AC = 30^\circ$.



Note:
Diagram not
drawn to scale

- (a) Using triangle ACD calculate the length AC.

(b) Calculate the size of $\hat{A} \hat{B} C$.

Working:

Answers:

(a)

(b)

(Total 8 marks)

5. Andrew is at point A in a park. A deer is 3 km directly north of Andrew, at point D. Brian is 1.8 km due west of Andrew, at point B.

(a) Draw a diagram to represent this information.

(b) Calculate the distance between Brian and the deer.

(c) Brian looks at Andrew, and then turns through an angle θ to look at the deer. Calculate the value of θ .

Diagram: (a)

Working:

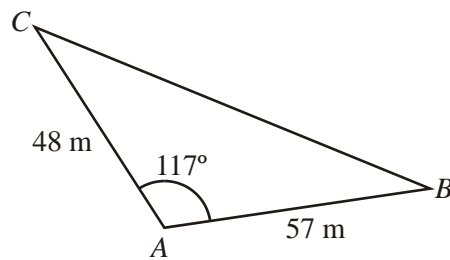
Answers:

(b)

(c)

(Total 8 marks)

6. The diagram shows the plan of a playground with dimensions as shown.



Calculate

- (a) the length BC ;
(b) the area of triangle ABC .

Working:

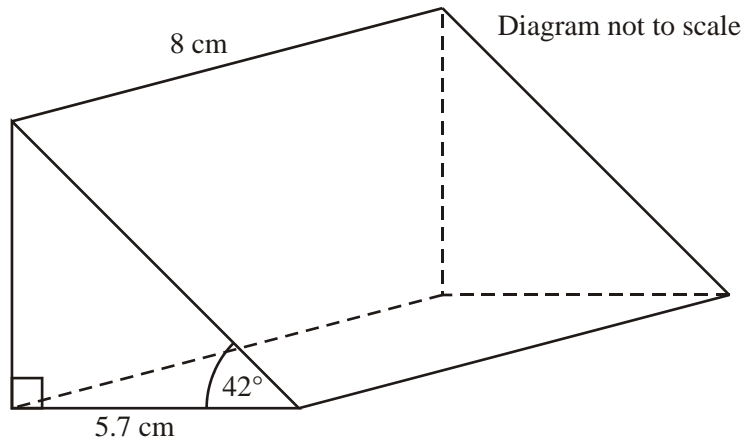
Answers:

(a)

(b)

(Total 4 marks)

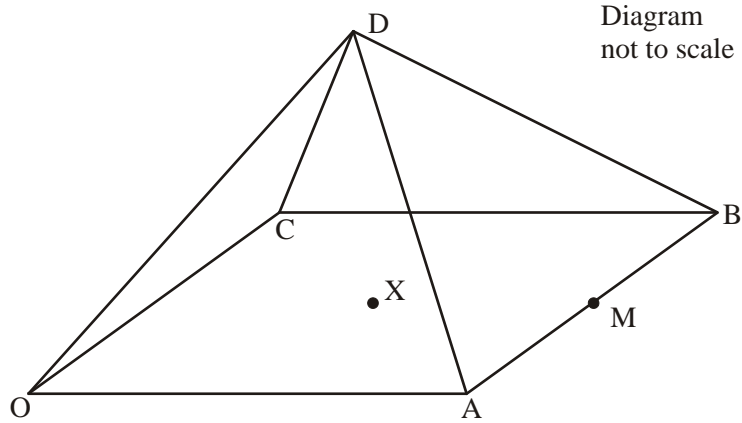
7. Find the volume of the following prism.



(Total 4 marks)

8. OABCD is a square based pyramid of side 4 cm as shown in the diagram. The vertex D is 3 cm directly above X, the centre of square OABC. M is the midpoint of AB.
- (a) Find the length of XM.
- (b) Calculate the length of DM.

- (c) Calculate the angle between the face ABD and the base OABC.



Working:

Answers:

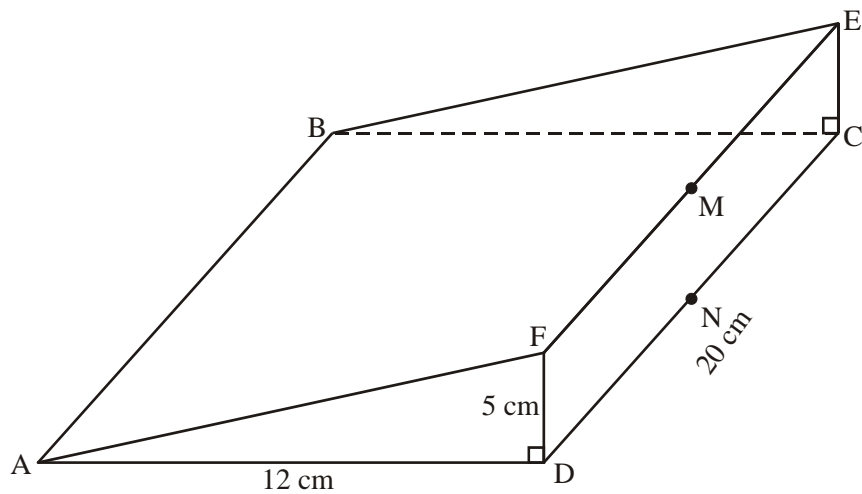
(a)

(b)

(c)

(Total 8 marks)

9. In the diagram below ABEF, ABCD and CDFE are all rectangles. $AD = 12$ cm, $DC = 20$ cm and $DF = 5$ cm. M is the midpoint of EF and N is the midpoint of CD .



- (a) Calculate (i) the length of AF;
(ii) the length of AM.

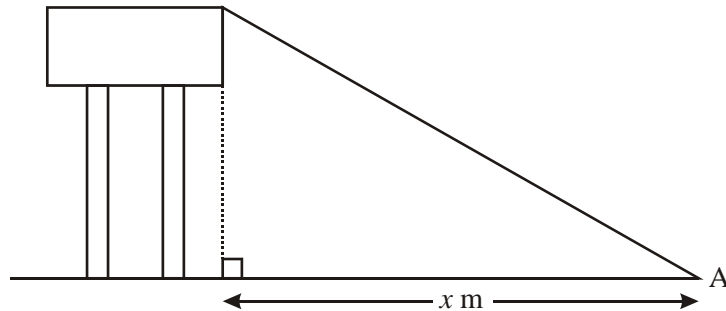
(3)

- (b) Calculate the angle between AM and the face ABCD.

(3)

(Total 6 marks)

10. The diagram shows a water tower standing on horizontal ground. The height of the tower is 26.5 m.



From a point A on the ground the angle of elevation to the top of the tower is 28° .

- (a) On the diagram, show and label the angle of elevation, 28° .
(b) Calculate, **correct to the nearest metre**, the distance x m.

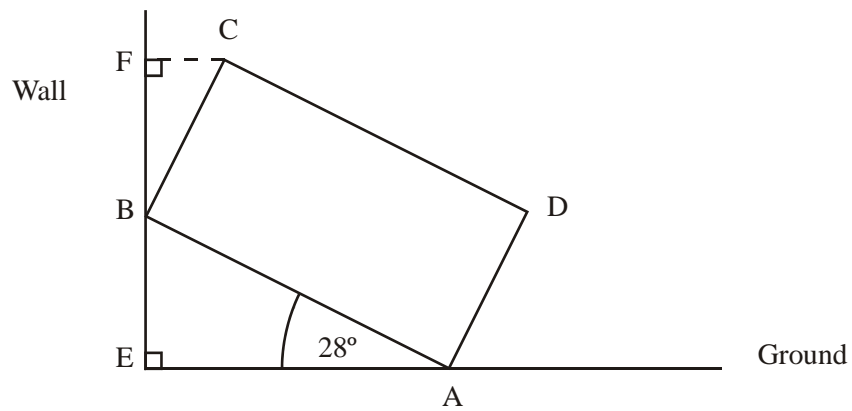
Working:

Answers:

(b)

(Total 4 marks)

11. A rectangular block of wood with face ABCD leans against a vertical wall, as shown in the diagram below. $AB = 8$ cm, $BC = 5$ cm and angle $\hat{BAE} = 28^\circ$.



Find the vertical height of C above the ground.

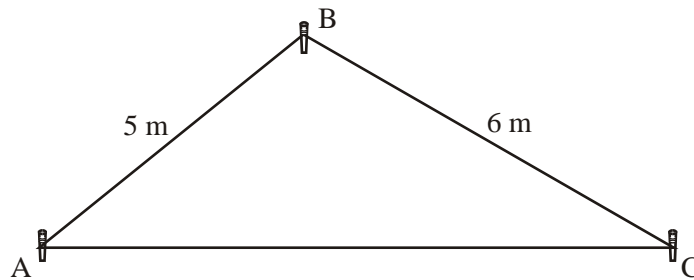
Working:

Answer:

(Total 4 marks)

12. A gardener pegs out a rope, 19 metres long, to form a triangular flower bed as shown in this diagram.

Diagram not to scale



Calculate

- (a) the size of the angle BAC;

(3)

(b) the area of the flower bed.

(2)
(Total 5 marks)

13. Three right pyramids *Andal*, *Batsu* and *Cartos* were discovered in the dense jungle of *Marhartmasol*. Each pyramid has a square base with centres A, B and C respectively.

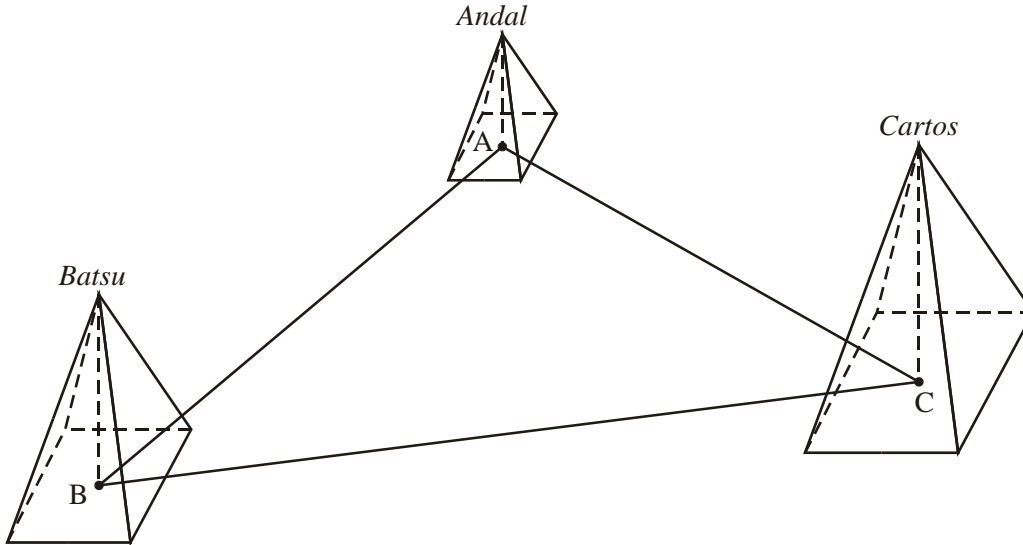


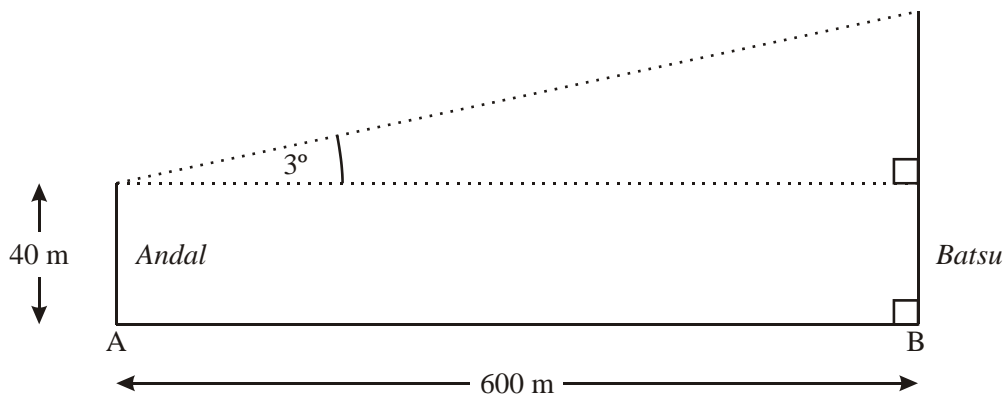
Diagram not to scale

A surveying team was lowered from a helicopter to the top of *Andal* to take measurements of the area. *Andal* is 40 metres high. The angle of elevation from the top of *Andal* to the top of *Batsu* is 3° . The horizontal distance from A, the centre of the base of *Andal*, to B, the centre of the base of *Batsu* is 600 metres.

- (a) Use the diagram below to find the height of *Batsu*.

(3)

Diagram not to scale

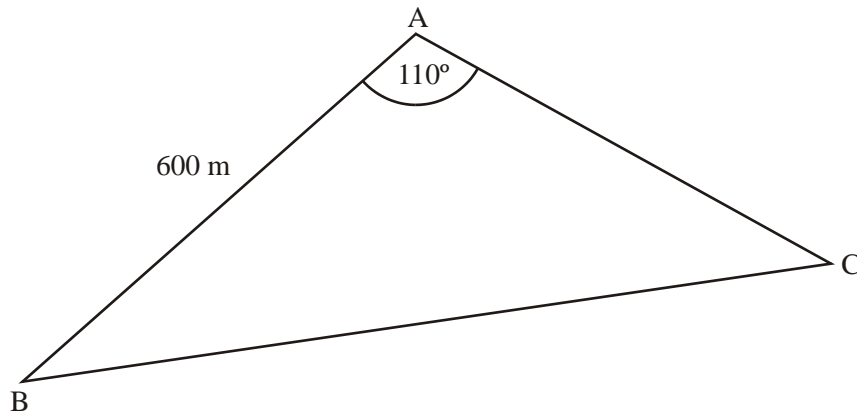


- (b) *Cartos* is found to be 92 metres high and the angle of elevation from the top of *Andal* to the top of *Cartos* is 4° .
- (i) Draw a diagram similar to the diagram in part (a) to show the relationship between *Andal* and *Cartos*.
- (ii) What is the horizontal distance from A to C?

(4)

- (c) The diagram below represents measurements relative to the centres of the bases of the pyramids. The surveyors determined the angle at A to be 110° , and the distance AB to be 600 m.

Diagram not to scale

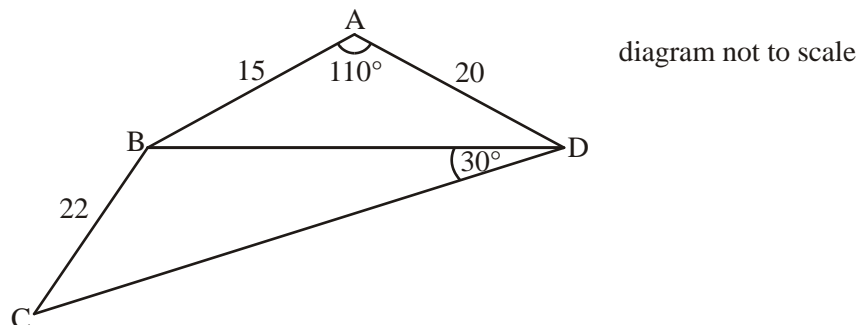


- (i) What is the distance between B and C? Give your answer to the nearest metre.
- (ii) What is the size of angle ACB?
- (iii) What is the area of the land inside triangle ABC?

(8)

(Total 15 marks)

14. The diagram below shows a field ABCD with a fence BD crossing it. AB = 15m, AD = 20 m and angle BAD = 110° . BC = 22 m and angle BDC = 30° .



- (a) Calculate the length of BD. (3)
- (b) Calculate the size of angle $\hat{B}C\hat{D}$. (3)

One student gave the answer to (a) “correct to 1 significant figure” and used this answer to

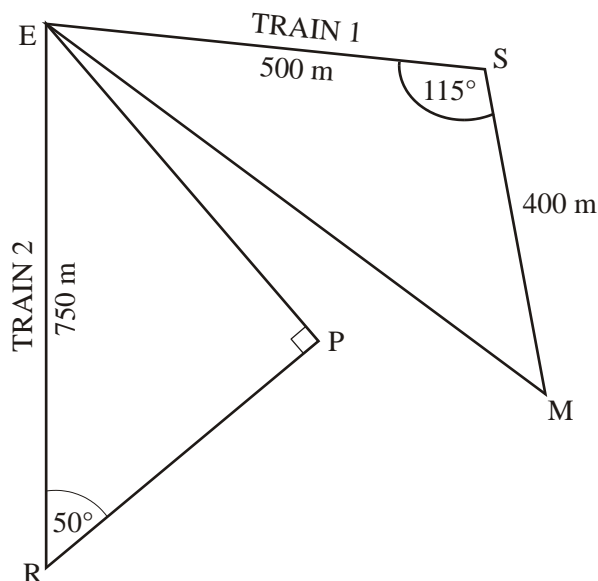
calculate the size of angle $\hat{B} \hat{C} D$.

(c) Write down the length of BD correct to 1 significant figure. (1)

(d) Find the size of angle BCD that the student calculated, **giving your answer correct to 1 decimal place.** (2)

(e) Hence find the percentage error in his answer for angle $\hat{B} \hat{C} D$. (3)
(Total 12 marks)

15. A recreation park has two trains. Train 1 takes visitors from the entrance (E) to the swimming pool (S), to the mini golf (M) and back to the entrance. Train 2 takes visitors from the entrance (E) to the play area (P), to the racing track (R) and back to the entrance. This is shown in the diagram.



ES = 500 m
 SM = 400 m
 ER = 750 m
 $\hat{E} \hat{S} \hat{M} = 115^\circ$
 $\hat{E} \hat{R} \hat{P} = 50^\circ$
 $\hat{E} \hat{P} \hat{R} = 90^\circ$

[not to scale]

(a) Calculate the total distance **Train 2** travels in one journey from E to P to R to E. (5)

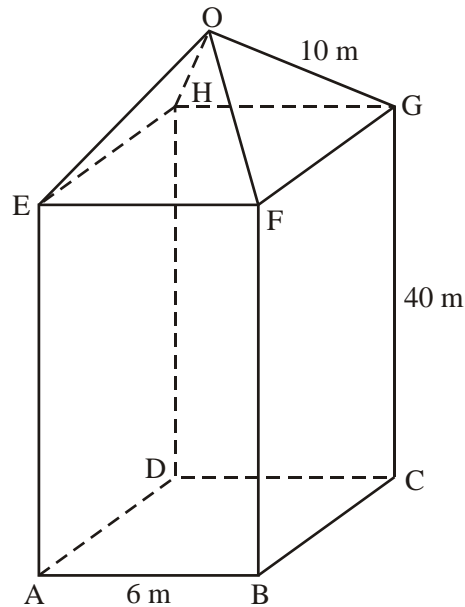
(b) (i) Show that $EM = 761$ m correct to 3 s.f..

(ii) If the trains travel at 2 ms^{-1} find the time taken for **Train 1** to complete a journey from E to S to M to E. Give your answer to the nearest second.

(6)
(Total 11 marks)

16. An office tower is in the shape of a cuboid with a square base. The roof of the tower is in the shape of a square based right pyramid.

The diagram shows the tower and its roof with dimensions indicated. The diagram is **not** drawn to scale.

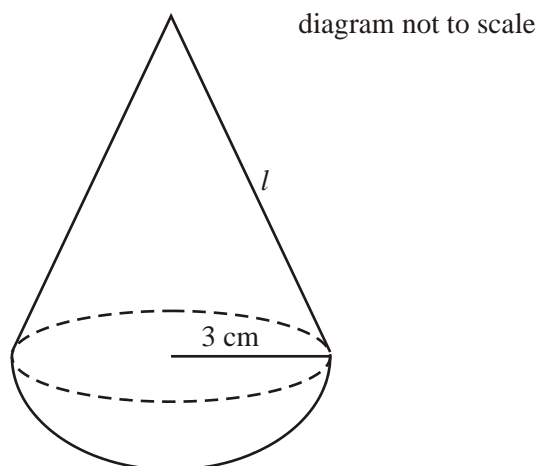


- (a) Calculate, correct to three significant figures,
- (i) the size of the angle between OF and FG; (3)
 - (ii) the shortest distance from O to FG; (2)
 - (iii) the total surface area of the four triangular sections of the roof; (3)
 - (iv) the size of the angle between the slant height of the roof and the plane EFGH; (2)
 - (v) the height of the tower from the base to O. (2)

A parrot's nest is perched at a point, P, on the edge, BF, of the tower. A person at the point A, outside the building, measures the angle of elevation to point P to be 79° .

- (b) Find, correct to three significant figures, the height of the nest from the base of the tower. (2)
- (Total 14 marks)**

17. A child's toy is made by combining a hemisphere of radius 3 cm and a right circular cone of slant height l as shown on the diagram below.

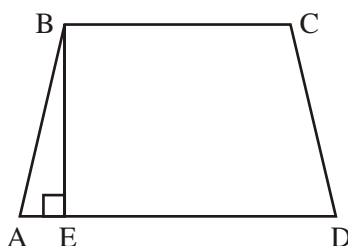


- (a) Show that the volume of the hemisphere is $18\pi \text{ cm}^3$. (2)
- The volume of the cone is two-thirds that of the hemisphere.
- (b) Show that the vertical height of the cone is 4 cm. (4)
- (c) Calculate the slant height of the cone. (2)
- (d) Calculate the angle between the slanting side of the cone and the flat surface of the hemisphere. (3)
- (e) The toy is made of wood of density 0.6 g per cm^3 . Calculate the weight of the toy. (3)
- (f) Calculate the total surface area of the toy. (5)

(Total 19 marks)

18. ABCD is a trapezium with $AB = CD$ and $[BC]$ parallel to $[AD]$. $AD = 22 \text{ cm}$, $BC = 12 \text{ cm}$, $AB = 13 \text{ cm}$.

Diagram not to scale



- (a) Show that $AE = 5 \text{ cm}$. (2)
- (b) Calculate the height BE of the trapezium. (2)

(2)

(c) Calculate

(i) $\hat{B}AE$;

(ii) $\hat{B}CD$.

(3)

(d) Calculate the length of the diagonal [CA].

(3)

(Total 10 marks)