

- 1 The diagram shows a prism  $ABCDEFGH$  with a horizontal base.

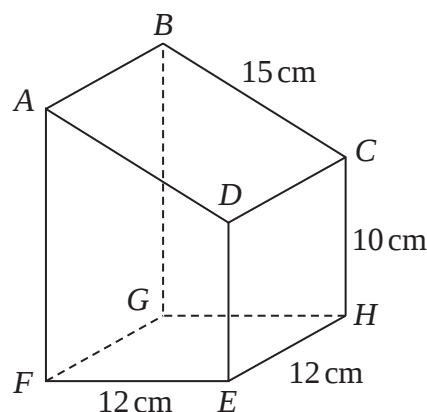


Diagram **NOT**  
accurately drawn

The base of the prism,  $EFGH$ , is a square of side 12 cm.

Trapezium  $ADEF$  is a cross section of the prism where  $AF$  and  $DE$  are vertical edges.

$$DE = CH = 10 \text{ cm}$$

$$AD = BC = 15 \text{ cm}$$

- (a) Work out the size of the angle between  $CF$  and the base  $EFGH$ .  
Give your answer correct to one decimal place.

.....  
(3)

- (b) Work out the length of  $BE$ .  
Give your answer correct to one decimal place.

..... cm  
(3)

(Total for Question 1 is 6 marks)

2 The diagram shows a cuboid  $ABCDEFGH$ .

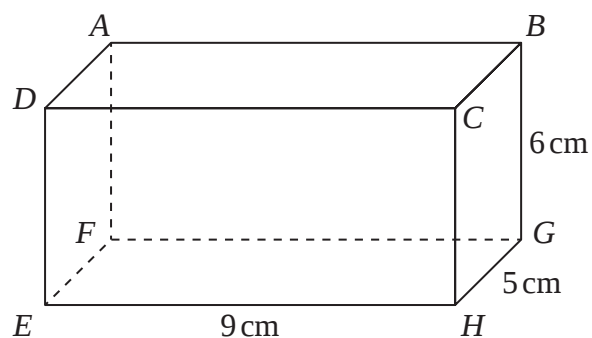


Diagram **NOT**  
accurately drawn

$EH = 9\text{ cm}$ ,  $HG = 5\text{ cm}$  and  $GB = 6\text{ cm}$ .

Work out the size of the angle between  $AH$  and the plane  $EFGH$ .  
Give your answer correct to 3 significant figures.

o

---

(Total for Question 2 is 4 marks)

- 3 The diagram shows a triangular prism  $ABCDEF$  with a horizontal base  $ABEF$ .

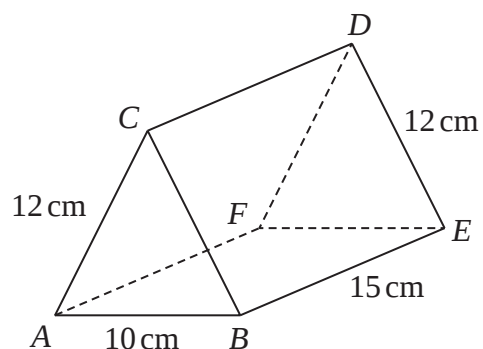


Diagram **NOT**  
accurately drawn

$$AC = BC = FD = ED = 12 \text{ cm} \quad AB = 10 \text{ cm} \quad BE = 15 \text{ cm}$$

Calculate the size of the angle between  $AD$  and the base  $ABEF$ .

Give your answer correct to 3 significant figures.

(Total for Question 3 is 4 marks)

- 4  $ABC$  is an isosceles triangle in a horizontal plane.  
The point  $T$  is vertically above  $B$ .

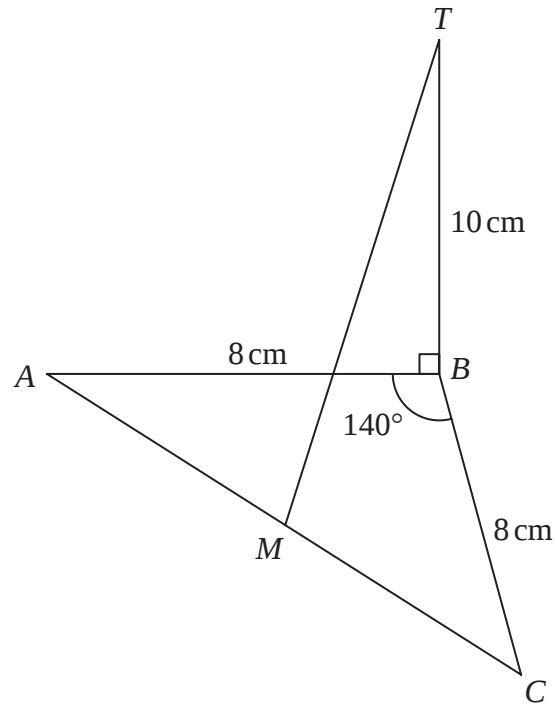


Diagram **NOT**  
accurately drawn

$$\text{Angle } ABC = 140^\circ$$

$$AB = BC = 8 \text{ cm}$$

$$TB = 10 \text{ cm}$$

$M$  is the midpoint of  $AC$ .

Calculate the size of the angle between  $MT$  and the horizontal plane  $ABC$ .  
Give your answer correct to one decimal place.

o

(Total for Question 4 is 4 marks)

---

5 The diagram shows a solid prism  $ABCDEFGH$ .

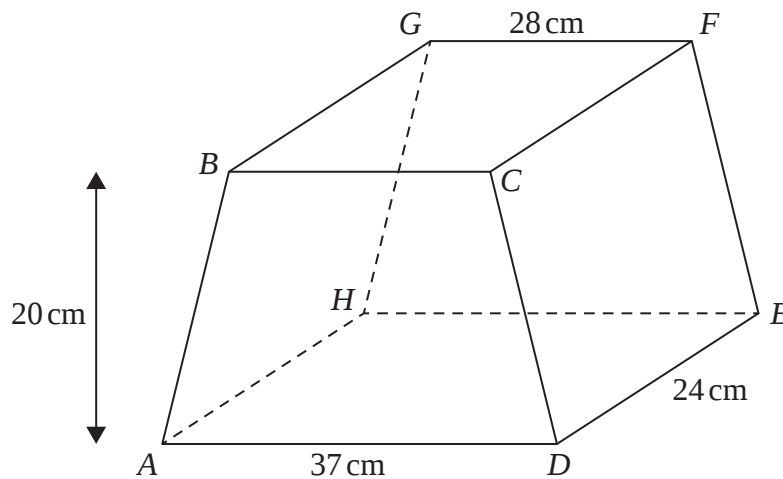


Diagram **NOT**  
accurately drawn

The trapezium  $ABCD$ , in which  $AD$  is parallel to  $BC$ , is a cross section of the prism.

The base  $ADEH$  of the prism is a horizontal plane.

$ADEH$  and  $BCFG$  are rectangles.

The midpoint of  $BC$  is vertically above the midpoint of  $AD$  so that  $BA = CD$ .

$$AD = 37 \text{ cm} \quad GF = 28 \text{ cm} \quad DE = 24 \text{ cm}$$

The perpendicular distance between edges  $AD$  and  $BC$  is 20 cm.

(b) Calculate the size of the angle between  $AF$  and the plane  $ADEH$ .

Give your answer correct to one decimal place.

(3)

(Total for Question 5 is 3 marks)

6 The diagram shows a cube  $ABCDEFGH$  with sides of length 6 cm.

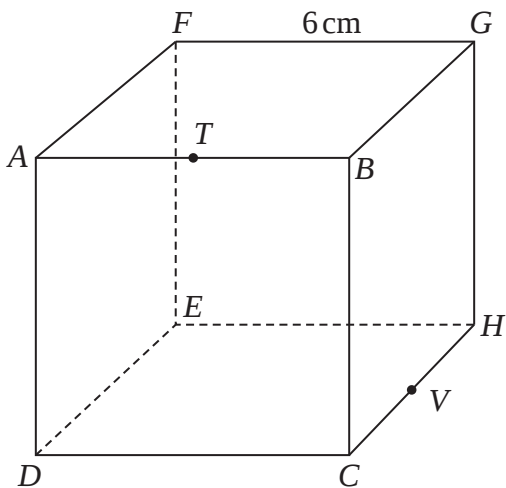


Diagram **NOT** accurately drawn

$T$  is the midpoint of  $AB$  and  $V$  is the midpoint of  $CH$

Work out the distance from  $T$  to  $V$  in a straight line through the cube.  
Give your answer in the form  $\sqrt{a}$  cm where  $a$  is an integer.

..... cm

7  $ABCD$  is a horizontal rectangular field.

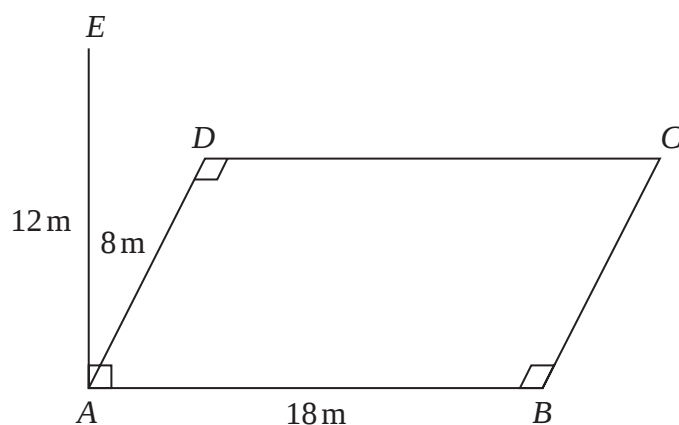


Diagram **NOT**  
accurately drawn

A vertical pole,  $AE$ , is placed at the corner  $A$  of the field.

$$AE = 12 \text{ m} \quad AB = 18 \text{ m} \quad AD = 8 \text{ m}$$

Calculate the size of the angle between  $EC$  and the plane  $ABCD$   
Give your answer correct to one decimal place.

(Total for Question 7 is 3 marks)

8 The diagram shows the prism  $ABCDEFGHJK$  with horizontal base  $AEFG$

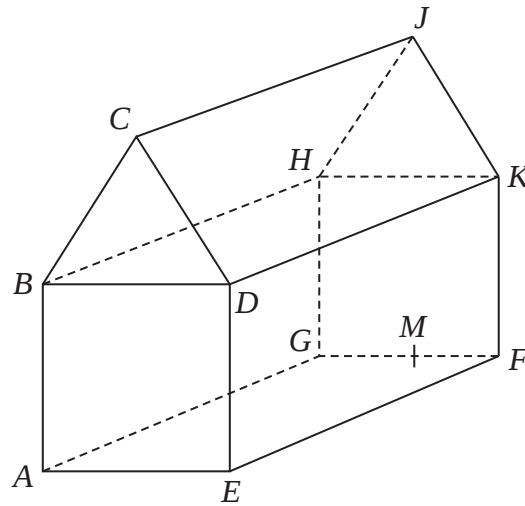


Diagram **NOT**  
accurately drawn

$ABCDE$  is a cross section of the prism where

$ABDE$  is a square

$BCD$  is an equilateral triangle

$EF = 2 \times AE$

$M$  is the midpoint of  $GF$  so that  $JM$  is vertical.

Angle  $MAJ = y^\circ$

Given that  $\tan y^\circ = T$

find the value of  $T$ , giving your answer in the form  $\frac{\sqrt{p} + \sqrt{q}}{17}$  where  $p$  and  $q$  are integers.

$$T = \dots\dots\dots$$

---

**(Total for Question 8 is 5 marks)**

---

- 9 The diagram shows a triangular prism,  $ABCDEF$ , with a rectangular base  $ABCD$

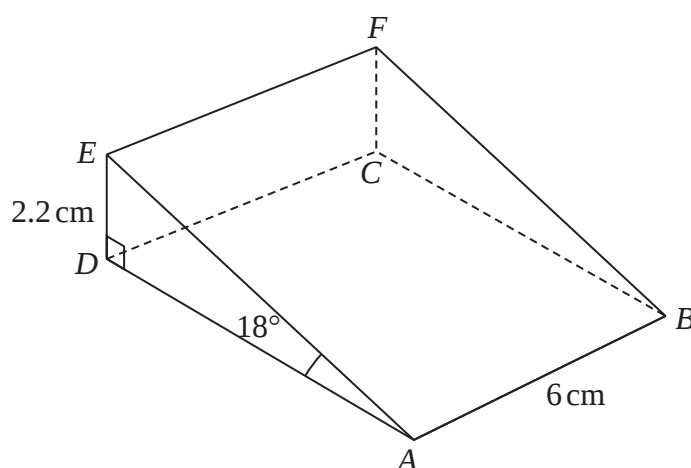


Diagram **NOT**  
accurately drawn

$$AB = 6 \text{ cm}$$

$$DE = 2.2 \text{ cm}$$

$$\text{angle } DAE = 18^\circ$$

$$\text{angle } ADE = 90^\circ$$

Work out the angle that  $BE$  makes with the plane  $ABCD$

Give your answer correct to one decimal place.

(Total for Question 9 is 4 marks)

10 The diagram shows a solid prism  $ABCDEF GHIJ$

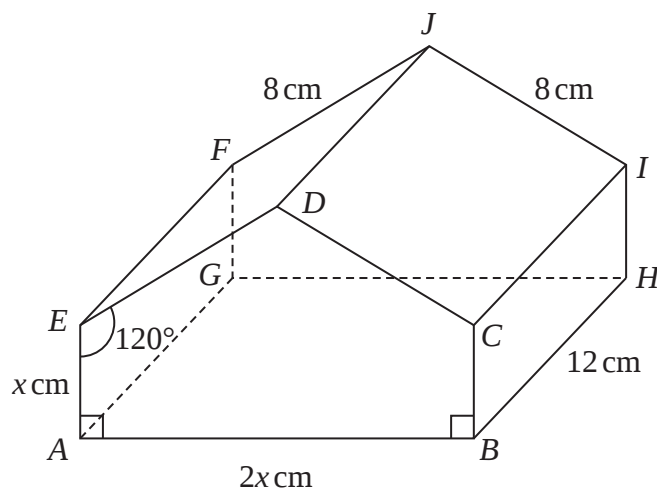


Diagram **NOT**  
accurately drawn

The prism is such that each cross section is a pentagon where

$$AE = BC = x \text{ cm}$$

$$AB = 2x \text{ cm}$$

$$ED = CD = 8 \text{ cm}$$

$$\text{angle } EAB = \text{angle } CBA = 90^\circ$$

$$\text{angle } AED = \text{angle } BCD = 120^\circ$$

Given that  $AG = BH = EF = DJ = CI = 12 \text{ cm}$

calculate the angle that  $AJ$  makes with the base  $ABHG$  of the prism.

Give your answer correct to 3 significant figures.

o

.....

(Total for Question 10 is 5 marks)

---

11 Here is a cuboid  $PQRSTUVW$

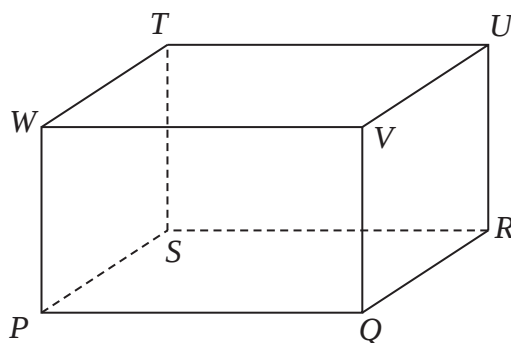


Diagram **NOT**  
accurately drawn

$$PR = 42 \text{ cm}$$

The size of the angle between  $PU$  and the plane  $PQRS$  is  $30^\circ$

$M$  is the midpoint of  $PR$

- (b) Work out the size of angle  $UMR$   
Give your answer correct to 3 significant figures.

.....  
(3)

(Total for Question 11 is 3 marks)

12 The diagram shows a triangle  $ABC$  and a flagpole  $BF$

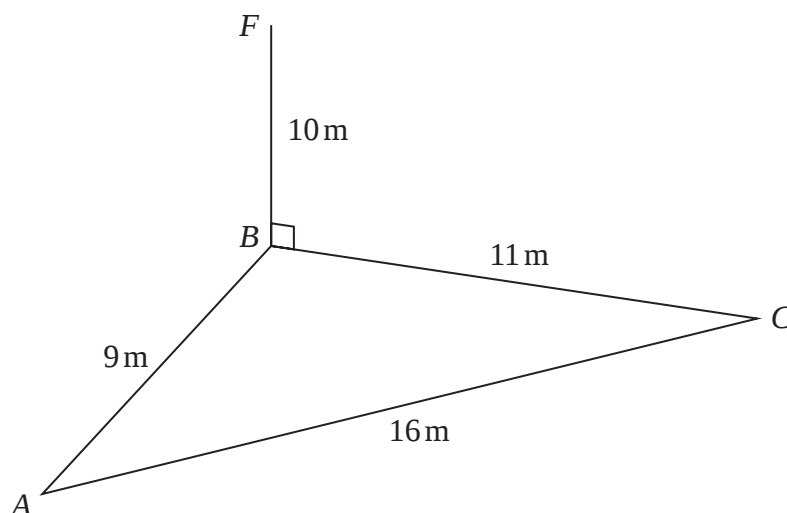


Diagram **NOT**  
accurately drawn

$A$ ,  $B$  and  $C$  are points on horizontal ground.

$BF$  is vertical.

$$AB = 9\text{ m} \quad BC = 11\text{ m} \quad AC = 16\text{ m} \quad BF = 10\text{ m}$$

$D$  is the point on  $AC$  such that angle  $BDC = 90^\circ$

Work out the size of the angle of elevation of the point  $F$  from the point  $D$   
Give your answer correct to one decimal place.

o

(Total for Question 12 is 5 marks)