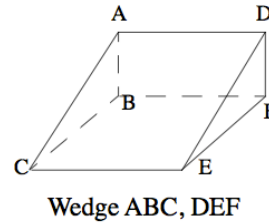
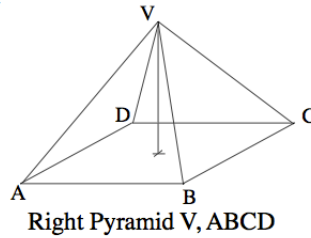
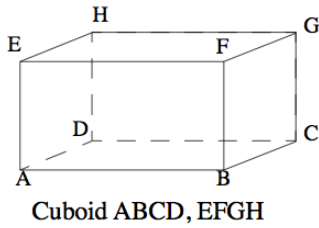


Right Angles in 3-Dimensions

Examples of figures you will have to draw



A cube ABCD, EFGH has a side length measuring 6 cm.

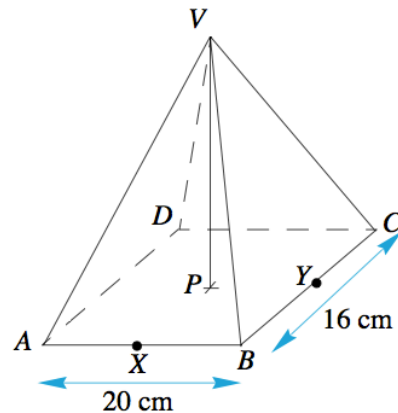
- Find the length of the segment $[AC]$.
- The length of the diagonal $[AG]$.
- The angle that the diagonal $[AG]$ makes with the base.

From a point X , 200 m due South of a cliff, the angle of elevation of the top of the cliff is 30° . From a point Y , due East of the cliff, the angle of elevation of the top of the cliff is 20° . How far apart are the points X and Y ?

A right pyramid with a rectangular base and a vertical height of 60 cm is shown in the diagram alongside. The points X and Y are the midpoints of the sides $[AB]$ and $[BC]$ respectively

Find

- (a) the length, AP .
- (b) the length of the edge $[AV]$.
- (c) the angle that the edge AV makes with the base $ABCD$.
- (d) the length, YV .
- (e) The angle that the plane BCV makes with the base.



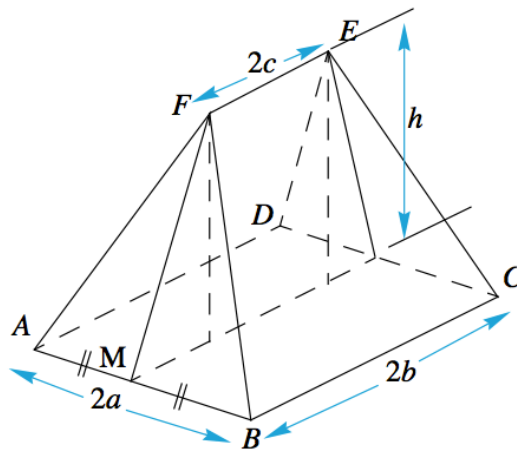
The angle of depression from the top of a tower to a point X South of the tower, on the ground and 120 m from the foot of the tower is 24° . From point Y due West of X the angle of elevation to the top of the tower is 19° .

- Illustrate this information on a diagram.
- Find the height of the tower.
- How far is Y from the foot of the tower?
- How far apart are the points X and Y?

A symmetrical sloping roof has dimensions as shown in the diagram.

Find

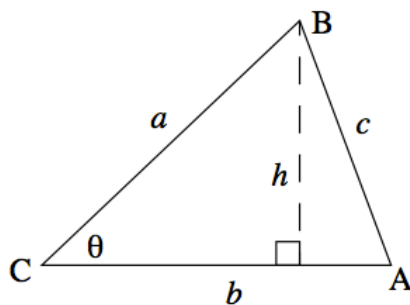
- the length of [FM].
- the angle between the plane BCEF and the ground.
- the angle between the plane ABF and the ground
- the total surface area of the roof.



A camera sits on a tripod with legs 1.5 m long. The feet rest on a horizontal flat surface and form an equilateral triangle of side lengths 0.75 m. Find

- the height of the camera above the ground.
- the angles made by the legs with the ground.
- the angle between the sloping faces formed by the tripod legs.

Area of a Triangle



For ANY triangle, given sides a , b and the included angle θ

We know:



But what if we don't have h ?



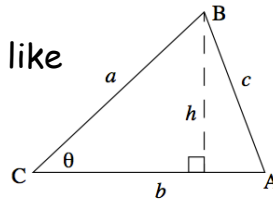
Therefore the area formula for ANY triangle is:

$$A = \frac{1}{2}b \times a \times \sin\theta$$

Because triangles are typically labeled like

θ might be replaced by C

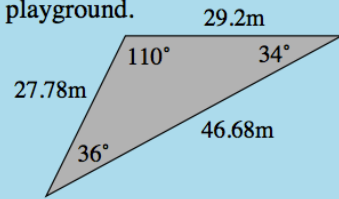
$$A = \frac{1}{2}ab \sin C \quad \text{*this is in your booklet!}$$



Write the area formula using the two other combinations of sides and angles.

Find the area of the triangle PQR given that $PQ = 9$ cm, $QR = 10$ cm and $\angle PQR = 40^\circ$.

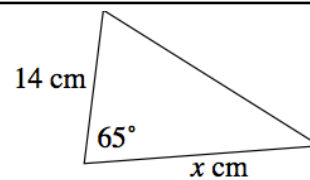
The diagram shows a triangular children's playground.
Find the area of the playground



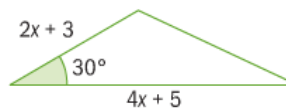
Find the areas of these triangles that are labelled using standard notation.

	<i>a</i> cm	<i>b</i> cm	<i>c</i> cm	<i>A</i>	<i>B</i>	<i>C</i>
(a)	35.94	128.46	149.70	12°	48°	120°
(b)	35.21	54.55	81.12	20°	32°	128°
(c)	46.35	170.71	186.68	14°	63°	103°

The triangle shown has an area of 110 cm^2 . Find x .



- 5 The triangle shown has an area of 30 cm^2 .
Find the value of x .



Homework

3D Right Angled Trig & Area of a Triangle WS

Extra Practice

Chapter 11.6 - 11J

Homework Answers

- 1.** (a) $39^\circ 48'$ (b) $64^\circ 46'$ **2.** (a) 12.81 cm (b) 61.35 cm (c) $77^\circ 57'$ (d) 60.83 cm (e) $80^\circ 32'$
3. (a) $21^\circ 48'$ (b) $42^\circ 2'$ (c) $26^\circ 34'$ **4.** (a) 2274 (b) 12.7° **5.** 251.29 m **6.** (a) 103.5 m (b) 35.26°
 (c) 39.23° **7.** (b) 53.43 (c) 155.16 m (d) 145.68 m **8.** (b) 48.54 m **9.** (a) $\sqrt{(b-c)^2 + h^2}$
 (b) $\tan^{-1}\left(\frac{h}{a}\right)$ (c) $\tan^{-1}\left(\frac{h}{b-c}\right)$ (d) $2(b+c)\sqrt{h^2 + a^2} + 2a\sqrt{(b-c)^2 + h^2}$ **10.** 82.80 m
11. (a) 40.61 m (b) 49.46 m **12.** (a) 10.61 cm (b) $75^\circ 58'$ (c) $93^\circ 22'$ **13.** (a) 1.44 m (b) $73^\circ 13'$
 (c) $62^\circ 11'$
1. (a) 1999.2 cm^2 (b) 756.8 cm^2 (c) 3854.8 cm^2 (d) 2704.9 cm^2 (e) 538.0 cm^2 (f) 417.5 cm^2
 (g) 549.4 cm^2 (h) 14.2 cm^2 (i) 516.2 cm^2 (j) 281.5 cm^2 (k) 918.8 cm^2 (l) 387.2 cm^2
 (m) 139.0 cm^2 (n) 853.7 cm^2 (o) 314.6 cm^2 **2.** 69345 m^2 **3.** $100\pi - 6\sqrt{91} \text{ cm}^2$ **4.** 17.34 cm
5. (a) 36.77sq units (b) 14.70 sq units (c) 62.53 sq units **6.** 52.16 cm^2 **7.** $27^\circ 2'$
8. $\frac{(b+a \times \tan \theta)^2}{2 \tan \theta}$ **9.** Area of $\Delta ACD = 101.78 \text{ cm}^2$, area of $\Delta ABC = 61.38 \text{ cm}^2$