Solutions

4. What is the unknown angle measure in each triangle?
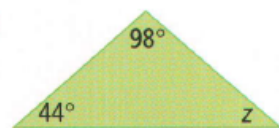
a)
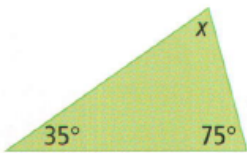
35°   75°   *x*

$$x + 35 + 75 = 180$$
$$x + 110 = 180$$
$$x + 110 - 110 = 180 - 110$$
$$x = 70°$$

b)

24°   66°   *y*

$$y + 24 + 66 = 180$$
$$y + 90 = 180$$
$$y + 90 - 90 = 180 - 90$$
$$y = 90°$$

c)

98°   44°   *z*

$$z + 44 + 98 = 180$$
$$z + 142 = 180$$
$$z + 142 - 142 = 180 - 142$$
$$z = 38°$$

5. The measures of two angles in a triangle are given. What is the measure of the third angle?
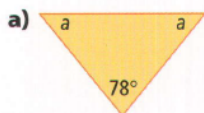
a) 49° and 62°
b) 57° and 112°
c) 39° and 39°

Let x = the missing angle

a)
$$x + 49 + 62 = 180$$
$$x + 111 = 180$$
$$x + 111 - 111 = 180 - 111$$
$$x = 69°$$

b)
$$x + 57 + 112 = 180$$
$$x + 169 = 180$$
$$x + 169 - 169 = 180 - 169$$
$$x = 11°$$

c)
$$x + 39 + 39 = 180$$
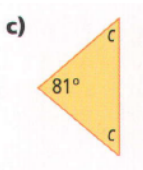$$x + 78 = 180$$
$$x + 78 - 78 = 180 - 78$$
$$x = 102°$$

7. What are the unknown angle measures in each isosceles triangle?

a)

$$a + a + 78 = 180$$
$$2a + 78 = 180$$
$$2a + 78 - 78 = 180 - 78$$
$$\frac{2a}{2} = \frac{102}{2}$$
$$a = 51°$$

b)
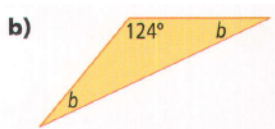
$$b + b + 124 = 180$$
$$2b + 124 = 180$$
$$2b + 124 - 124 = 180 - 124$$
$$\frac{2b}{2} = \frac{56}{2}$$
$$b = 28°$$

c)

$$c + c + 81 = 180$$
$$2c + 81 = 180$$
$$2c + 81 - 81 = 180 - 81$$
$$\frac{2c}{2} = \frac{99}{2}$$
$$c = 49.5°$$

8. The measure of one angle in an isosceles triangle is given. The other two angles are equal. What is the measure of each equal angle?

a) 36°
b) 88°
c) 155°

Let x = the equal angle

a) $x + x + 36 = 180$
$2x + 36 = 180$
$2x + 36 - 36 = 180 - 36$
$\dfrac{2x}{2} = \dfrac{144}{2}$
$x = 72$

b) $x + x + 88 = 180$
$2x + 88 = 180$
$2x + 88 - 88 = 180 - 88$
$\dfrac{2x}{2} = \dfrac{92}{2}$
$x = 46°$

c) $x + x + 155 = 180$
$2x + 155 = 180$
$2x + 155 - 155 = 180 - 155$
$\dfrac{2x}{2} = \dfrac{25}{2}$
$x = 12.5°$

11. Find the unknown angle measure in the triangle.

w
$69°$

Recall:
$\llcorner = 90°$

$w + 90 + 69 = 180$
$w + 159 = 180$
$w + 159 - 159 = 180 - 159$
$w = 21°$

12. Two angles in a right triangle are equal. Find the measure of each equal angle.

Recall: right △s have a 90° angle.

Let x = equal angle.

$x + x + 90 = 180$
$2x + 90 = 180$
$2x + 90 - 90 = 180 - 90$
$\dfrac{2x}{2} = \dfrac{90}{2}$
$x = 45°$
$\Rightarrow$ Equal angles are 45°

13. A triangle has three equal angles. What are their measures?

Let x = equal angles.

$x + x + x = 180$
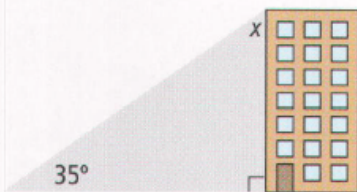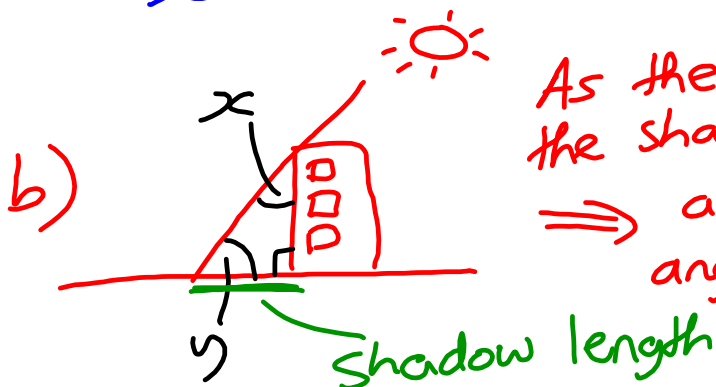
$3x = 180$

$\dfrac{3x}{x} = \dfrac{180}{3}$

$x = 60°$ $\Rightarrow$ Each angle is $60°$

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14. A building casts a shadow on a sunny day.

x

$35°$

a) Use the diagram to find the measure of the unknown angle x.

b) What happens to the angles in the triangle as the sun climbs higher in the sky?

a) $x + 35 + 90 = 180$

$x + 125 = 180$

$x + 125 - 125 = 180 - 125$

$x = 55°$

b)

As the sun gets higher the shadow length decreases.

$\Rightarrow$ angle $x \longrightarrow$ smaller

angle $y \longrightarrow$ bigger

Shadow length

**15.** Can two angles in a triangle each measure 95°? Explain.

No! Reason: $2 \times 95° = 190°$
The three angles must always total 180° in a triangle.

16. How many acute angles can a triangle have? Explain.

Three! There are many possibilities for three numbers less than 90 totalling 180.
Eg. 80, 60, 40
or 45, 85, 50

17. Part of the roof of a house looks like a triangle. The angle at the top is 118°, as shown in the diagram. The other two angles are equal. Find each of these angles.

118°

x)   (x
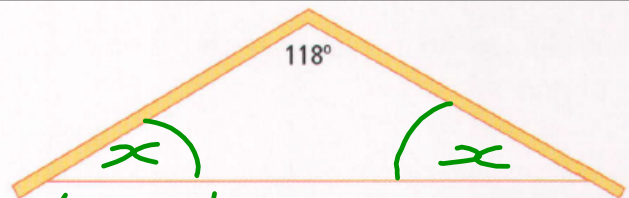
Let x = equal angles
$x + x + 118 = 180$
$2x + 118 = 180$
$2x + 118 - 118 = 180 - 118$
$\dfrac{2x}{2} = \dfrac{62}{2}$ $\Rightarrow$ Each angle is 31°
$x = 31$

18. The angles in a triangle have measures of x, $2x$, and $3x$ degrees. Find the values of the angle measures.

$$x + 2x + 3x = 180$$
$$\frac{6x}{6} = \frac{180}{6}$$
$$x = 30$$

$\Rightarrow$ The three angles are $30°$, $60°$ and $90°$

$\Rightarrow 2x = 2(30)$
$2x = 60$

$\Rightarrow 3x = 3(30)$
$3x = 90$

19. A totem pole is supported by two wires. Each wire makes a 68° angle with the ground. Find the unknown angle in each triangle.

$$x + 68 + 90 = 180$$
$$x + 158 = 180$$
$$x + 158 - 158 = 180 - 158$$
$$x = 22$$

$\Rightarrow$ Unknown angle in each triangle is $22°$

20. Two triangles have different sizes. Each triangle has a 60° angle and an 80° angle. What can you conclude about the two triangles? Explain.

The third angle in each triangle must be 40°.
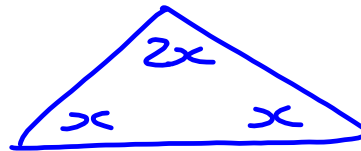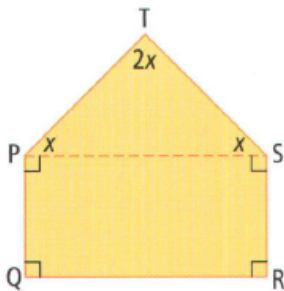
Let x = missing angle.

$$x + 60 + 80 = 180$$
$$x + 140 = 180$$
$$x + 140 - 140 = 180 - 140$$
$$x = 40$$

21. Home plate on a baseball diamond is in the shape of an irregular pentagon, as shown in the diagram.

What are the five internal angles on home plate?

$$x + x + 2x = 180$$
$$\frac{4x}{4} = \frac{180}{4}$$
$$x = 45$$

Q and R both 90°

P and S both $x + 90$
$$= 45 + 90$$
$$= 135°$$

T is $2x$
$$= 2(45)$$
$$= 90°$$

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