

Name: Key
 Topics: Exterior angle theorem, interior and exterior angles of polygons

Homework

1) If the measures of the angles in a triangle are in the ratio 3:4:5, the measure of an exterior angle of the triangle cannot be

- A) 165° C) 105°
 B) 135° D) 120°

$$3x + 4x + 5x = 180$$

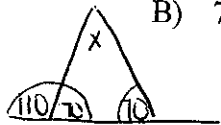
$$12x = 180$$

$$x = 15$$



2) An exterior angle at the base of an isosceles triangle measures 110°. What is the measure of the vertex angle?

- A) 110° C) 40°
 B) 70° D) 55°



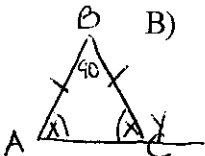
$$x + 70 + 70 = 180$$

$$x + 140 = 180$$

$$x = 40$$

3) In isosceles triangle ABC, $\overline{AB} \cong \overline{BC}$ and $m\angle B = 90^\circ$. What is the measure of an exterior angle at vertex C?

- A) 90° C) 135°
 B) 30° D) 45°



$$x + x + 90 = 180$$

$$2x + 90 = 180$$

$$-90 \quad -90$$

$$\frac{2x = 90}{2} \quad \frac{90}{2} \quad x = 45$$

4) If two angles of a triangle measure 43° and 48°, the triangle is

- A) obtuse C) right
 B) acute D) isosceles



$$x + 43 + 48 = 180$$

$$x + 91 = 180$$

$$-91 \quad -91 \quad x = 89$$

5) If the measures of the three angles of a triangle are represented by x° , $(2x - 20)^\circ$, and $(3x - 10)^\circ$, then the triangle is

- A) equilateral C) obtuse
 B) right D) isosceles

$$x + 2x - 20 + 3x - 10 = 180$$

$$6x - 30 = 180$$

$$+30 \quad +30$$

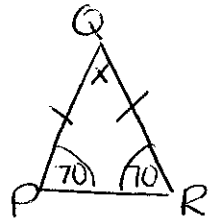
$$\hline 6x = 210$$

$$x = 35$$

6) Given: In $\triangle PQR$, $\overline{PQ} \cong \overline{QR}$.

If $m\angle P = 70^\circ$, what is $m\angle Q$?

- A) 40° C) 70°
 B) 35° D) 55°



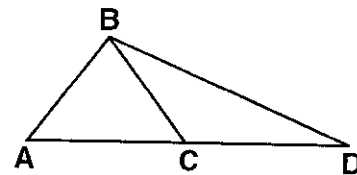
$$x + 70 + 70 = 180$$

$$x + 140 = 180$$

$$x = 40$$

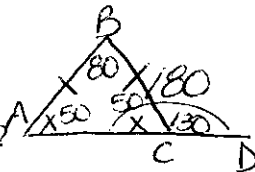
Questions 7 and 8 refer to the following:

In the figure below, $\overline{AB} \cong \overline{BC}$.



7) If $m\angle ABC = 80^\circ$, what is $m\angle BCD$?

- A) 100° C) 80°
 B) 50° D) 130°



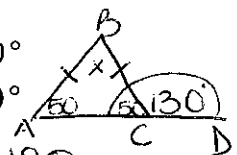
$$x + x + 80 = 180$$

$$-80 \quad -80$$

$$\frac{2x = 100}{2} \quad \frac{100}{2} \quad x = 50$$

8) If $m\angle BCD = 130^\circ$, what is $m\angle ABC$?

- A) 80° C) 100°
 B) 50° D) 130°



$$50 + x = 130$$

$$-50 \quad -50$$

$$x = 80$$

$$\text{or } x + 50 + 50 = 180$$

$$x + 100 = 180$$

$$-100 \quad -100 \quad x = 80$$

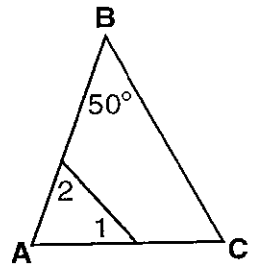
9) Can 65°, 45°, and 80° represent the measures of the three angles of a triangle? [Explain.]

$$65 + 45 + 80 = 180$$

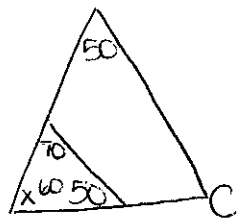
$$190 \neq 180$$

NO

Questions 10 and 11 refer to the following:



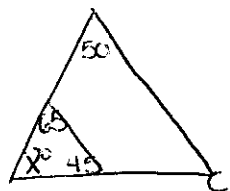
10) If $m\angle 1 = 50^\circ$ and $m\angle 2 = 70^\circ$, find $m\angle C$.



$$\begin{aligned} x + 50 + 70 &= 180 \\ x + 120 &= 180 \\ -120 \quad -120 & \\ \hline x &= 60 \end{aligned}$$

$$\begin{aligned} 60 + 50 + \angle C &= 180 \\ \angle C &= 70 \end{aligned}$$

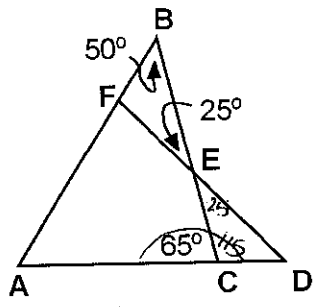
11) If $m\angle 1 = 45^\circ$ and $m\angle 2 = 65^\circ$, find $m\angle C$.



$$\begin{aligned} x + 65 + 45 &= 180 \\ x + 110 &= 180 \\ -110 \quad -110 & \\ \hline x &= 70 \end{aligned}$$

$$\begin{aligned} 70 + 50 + \angle C &= 180 \\ 120 + \angle C &= 180 \\ -120 \quad -120 & \\ \hline \angle C &= 60 \end{aligned}$$

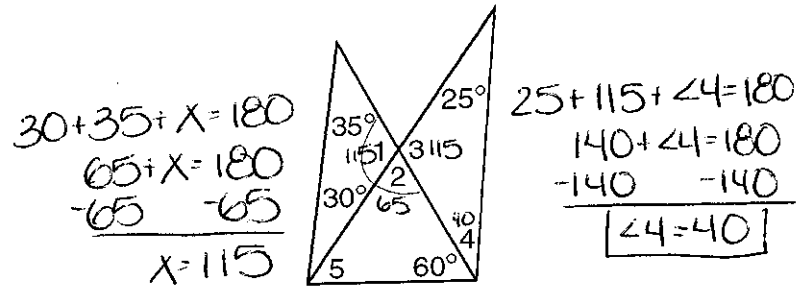
12) In the accompanying diagram of $\triangle ABC$, AC is extended to D , DEF , BEC , AFB , $m\angle B = 50^\circ$, $m\angle BEF = 25^\circ$, and $m\angle ACB = 65^\circ$.



What is $m\angle D$?
 A) 45°
 B) 40°
 C) 55°
 D) 50°

$$\begin{aligned} 25 + 115 + \angle D &= 180 \\ 140 + \angle D &= 180 \\ -140 \quad -140 & \\ \hline \angle D &= 40 \end{aligned}$$

13) Find the measure of the numbered angles in the diagram below.



$$\begin{aligned} 30 + 35 + x &= 180 \\ 65 + x &= 180 \\ -65 \quad -65 & \\ \hline x &= 115 \end{aligned}$$

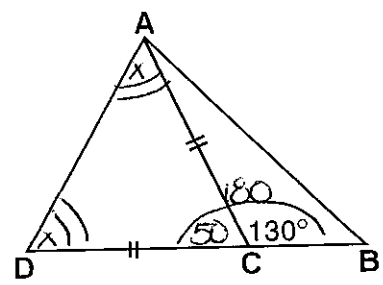
$$\begin{aligned} 25 + 115 + \angle 4 &= 180 \\ 140 + \angle 4 &= 180 \\ -140 \quad -140 & \\ \hline \angle 4 &= 40 \end{aligned}$$

$$\begin{aligned} 115 + \angle 2 &= 180 \\ -115 \quad -115 & \\ \hline \angle 2 &= 65 \end{aligned}$$

$$\begin{aligned} 65 + 60 + \angle 5 &= 180 \\ 125 + \angle 5 &= 180 \\ -125 \quad -125 & \\ \hline \angle 5 &= 55 \end{aligned}$$

$\angle 1 = 115$ $\angle 3 = 115$

14) In the accompanying diagram of $\triangle ADB$, \overline{DCB} , $\overline{CD} \cong \overline{CA}$, and $m\angle ACB = 130^\circ$.



Find $m\angle D$.

$$\begin{aligned} x + x + 50 &= 180 \\ 2x + 50 &= 180 \\ -50 \quad -50 & \\ \hline 2x &= 130 \\ \frac{2x}{2} &= \frac{130}{2} \\ x &= 65 \end{aligned}$$

15) What is the sum of the measures of the interior angles of a pentagon?

- A) 720° $n=5$
 B) 360°
 C) 540°
 D) 270°

$$\begin{aligned} 180(n-2) \\ 180(5-2) \\ 180(3) \\ 540 \end{aligned}$$

- 16) What is the sum of the measures of the interior angles of a octagon?
 A) 900° $n=8$ C) 1440°
 B) 1260° D) 1080°

$$\begin{aligned} 180(n-2) \\ 180(8-2) \\ 180(6) = 1080 \end{aligned}$$

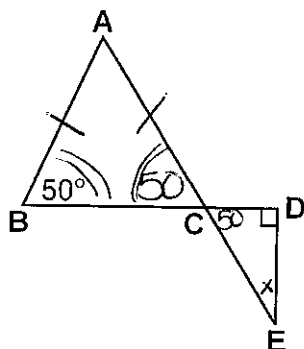
- 17) An equilateral triangle is a regular polygon.
 TRUE FALSE

- 18) An isosceles triangle is a regular polygon.
 TRUE FALSE

- 19) What is the number of degrees in the measure of one exterior angle of a regular pentagon? $n=5$
 A) 108° C) 540°
 B) 360° D) 72°

$$\frac{360}{n} = \frac{360}{5} = 72$$

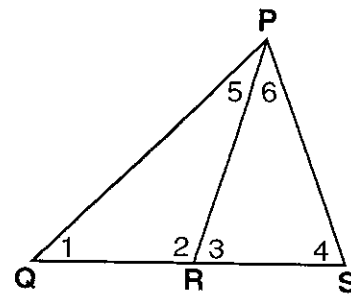
- 20) In the accompanying diagram, \overline{ACE} , $\overline{AB} \cong \overline{AC}$, $\overline{BCD} \perp \overline{DE}$, and $m\angle B = 50^\circ$.



Find $m\angle E$.

$$\begin{aligned} 50 + 90 + x &= 180 \\ 140 + x &= 180 \\ -140 \quad -140 & \\ \hline x &= 40 \end{aligned}$$

21)



$\angle 2$ is an exterior angle of which triangle shown?

$\triangle PRS$

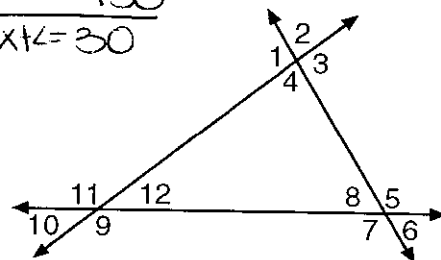
- 22) What is the number of sides of a regular polygon whose interior angles each measure 135° ?
 A) 8 C) 6
 B) 9 D) 7

$$\begin{aligned} \text{int} + \text{ext} &= 180 \\ 135 + \text{ext} &= 180 \\ -135 \quad -135 & \\ \hline \text{ext} &= 45 \end{aligned} \qquad \frac{360}{45} = 8$$

- 23) What type of regular polygon's interior angles each measure 150° ?
 A) decagon C) octagon
 B) dodecagon D) pentadecagon

$$\begin{aligned} \text{int} + \text{ext} &= 180 \\ 150 + \text{ext} &= 180 \\ -150 \quad -150 & \\ \hline \text{ext} &= 30 \end{aligned} \qquad \frac{360}{30} = 12$$

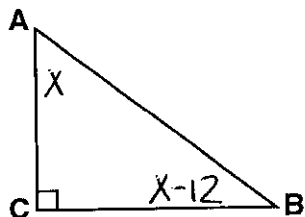
24)



What are the exterior angles of the triangle shown?

$\angle 1, \angle 3, \angle 5, \angle 7, \angle 11, \angle 9$

25) $\triangle ABC$ is a right triangle as shown below.

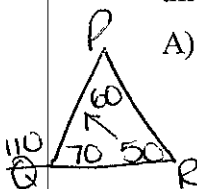


If the measure of $\angle B$ is 12° less than the measure of $\angle A$, find $m\angle A$.

$$\begin{aligned} X + X - 12 + 90 &= 180 \\ 2X + 78 &= 180 \\ -78 \quad -78 & \\ \hline 2X &= 102 \\ \frac{2X}{2} &= \frac{102}{2} \end{aligned} \quad \boxed{X = 51}$$

26) In triangle PQR, $m\angle R = 50^\circ$ and an exterior angle at Q measures 110° . What is the *shortest* side of the triangle?

- A) \overline{PR} B) \overline{QP} C) \overline{RQ}



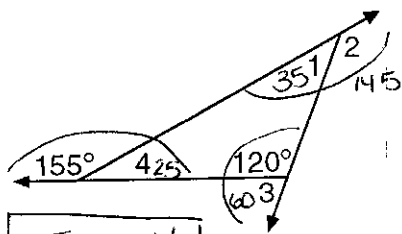
$$\begin{aligned} 70 + 50 + X &= 180 \\ 120 + X &= 180 \\ X &= 60 \end{aligned}$$

27) If the measure of an exterior angle of a regular polygon is 90° , then the polygon is

- A) a square C) a pentagon
B) a hexagon D) an octagon

$$\frac{360}{90} = 4$$

28) Find the measure of the numbered angles in the figure below.



$$180 - 155 = 25 = \angle 4$$

$$180 - 120 = 60 = \angle 3$$

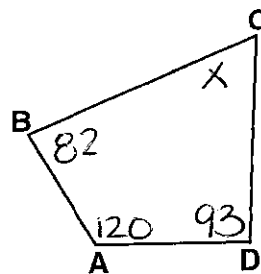
$$180 - 35 = 145 = \angle 2$$

$$25 + 120 + \angle 1 = 180$$

$$145 + \angle 1 = 180$$

$$\angle 1 = 35$$

29)



In quadrilateral ABCD, if $m\angle A = 120^\circ$, $m\angle B = 82^\circ$ and $m\angle D = 93^\circ$, find $m\angle C$.

$$\begin{aligned} X + 82 + 120 + 93 &= 360 \\ X + 295 &= 360 \\ -295 \quad -295 & \\ \hline X &= 65 \end{aligned} \quad \boxed{X = 65}$$

30) Find the sum of the measures of the exterior angles of a hexagon.

$$\boxed{360}$$

31) In quadrilateral ABCD, $m\angle A = 57^\circ$, $m\angle B = 65^\circ$, and $m\angle C = 118^\circ$. What is the measure of an exterior angle at D?

$$\begin{aligned} 118 + 57 + 65 + X &= 360 \\ 240 + X &= 360 \\ -240 \quad -240 & \\ \hline X &= 120 \end{aligned}$$

$$120 + \text{ext} + \angle = 180 \quad \boxed{\text{ext} + \angle = 60}$$

32) What type of regular polygon's interior angles each measure 144° ?

- A) hexagon C) decagon
B) octagon D) dodecagon

$$\begin{aligned} 144 + \text{ext} + \angle &= 180 \\ -144 & \quad -144 \\ \hline \text{ext} + \angle &= 36 \end{aligned}$$

$$\frac{360}{36} = 10$$