Find the value of each variable. Write answers in simplest radical form.

1)

1b)

2)

Find the sin, cos, and tangent of the below angles of the triangle below: (This means find the RATIO, or fractions)

3)

Sin A =

Cos A =

Tan B =

Sin B =

Tan A =

Use trigonometric ratios to find the value of each variable. Round decimals to the nearest tenth.

4)

5)

Find the values of the **angle** measures A and B.

6)

16   C
A
        12
20
        B

$m\angle A =$ _____ $m\angle B =$ _____

7)

60   C
A
        25
65
        B

$m\angle A =$ _____ $m\angle B =$ _____

8)

h

θ A

x

John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 33°. How tall is the tree?

Find the value of x.

9)

$x°$ 132°
                109°
93°

10)

76°
52°
            $x°$

11)

X   9   Y
7
B s C   t
3.5
A   8
5
   D   u
        Z
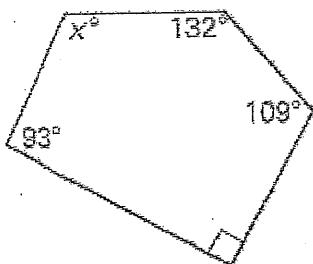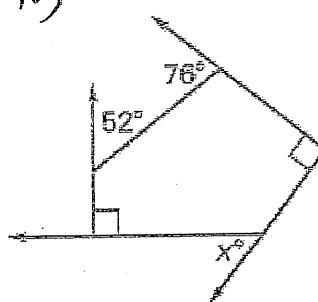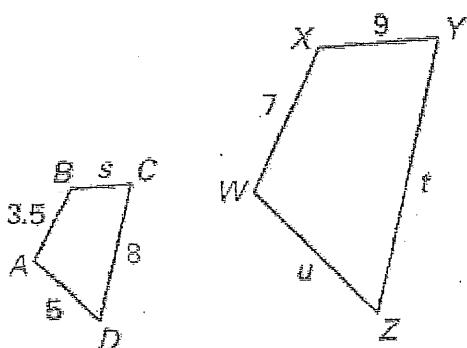
Given: ABCD ~ $WXYZ$

11a) Find the ratio of polygon ABCD to WXYZ

11b) Find the scale factor of polygon ABCD to WXYZ

11c) Find the value of t

Find the value of x

12)

(2x + 5)°
(6x + 15)°
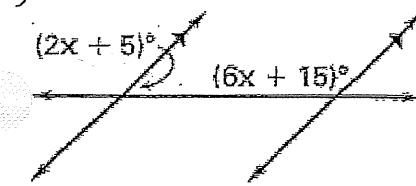
$2x + 5 + 6x + 15 = 180$
$8x + 20 = 180$

$\boxed{X = 20}$

13)

(4x − 12)°

60°
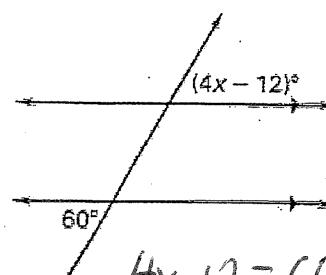
$4x - 12 = 60$
$+12 \quad +12$

$4x = 72$
$\boxed{X = 18}$

14)
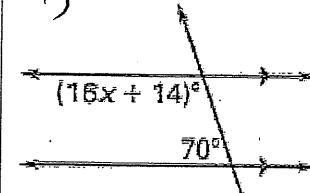
(16x + 14)°
70°

$16x + 14 + 70 = 180$
$16x + 84 = 180$

$16x = 96$
$\boxed{X = 6}$

**State the theorem used to prove the triangles are congruent.**
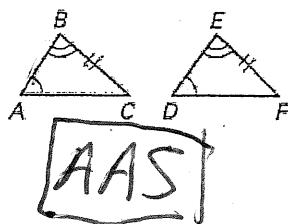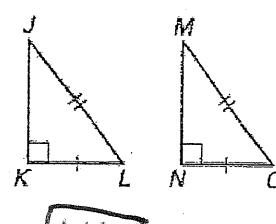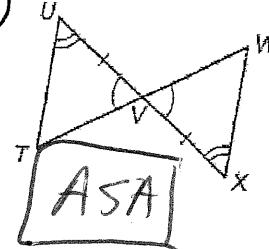
15)

B   E

A   C   D   F

$\boxed{AAS}$

16)

J   M

K   L   N   O

$\boxed{HL}$

17)

U   W

T   V   X

$\boxed{ASA}$

18) What is the measure of ∠XYZ?

A) 142°
B) 128°
C) 118°
D) 132°
E) Cannot be determined

X

38°

W   Y   Z

$a = 90 + 38$

$a = 128$

19) What is the measure of ∠B?

A) 90°
B) 38°
C) 104°
D) 52°
E) Cannot be determined

B

A   38°   38°   C

$x + 38 + 38 = 180$

$X = 104$

20) In the isosceles triangle below, find the value of x

2x°   2x°

32°
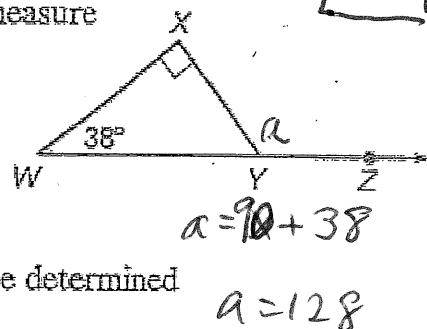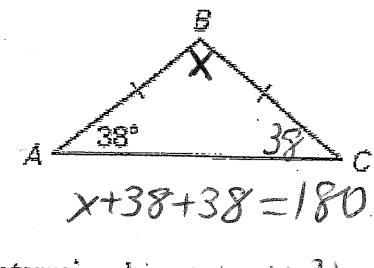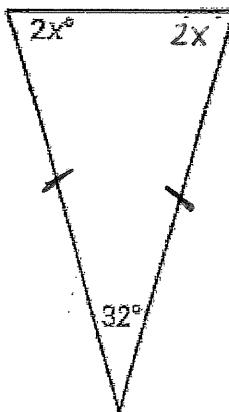
$2x + 2x + 32 = 180$
$4x + 32 = 180$

$\boxed{X = 37}$

21) The triangles shown are similar. Which of the following is *not* a correct statement?
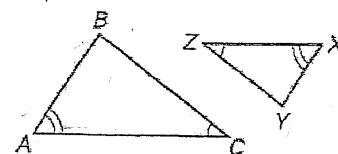
B

A   C

Z   X
Y

A) $\dfrac{AB}{XY} = \dfrac{BC}{YZ}$ ✓
B) $\triangle ABC \sim \triangle XYZ$ ✓
C) $\boxed{\dfrac{BC}{YZ} = \dfrac{AC}{XY}}$
D) $\dfrac{CA}{ZX} = \dfrac{BA}{YX}$ ✓
E) $\dfrac{AC}{XZ} = \dfrac{AB}{XY}$ ✓

Use the origin as the center of the dilation and the given scale factor to find the coordinates of the vertices of the image of the polygon.

22) $k = 2$
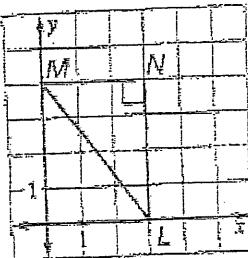
23) $k = \frac{1}{2}$

The two polygons are similar. Find the scale factor.

24)

110°

9

70°

6

25)

8

10

12

6

7.5

9

Find x:

26)

70°

$(3x - 10)°$

27)

51°

$x°$

28)

$2x + 23$

$8x$

29)

$5x - 3$

$x + 12$
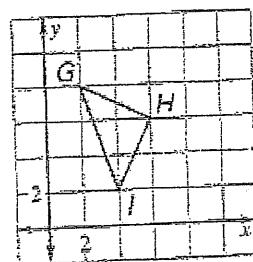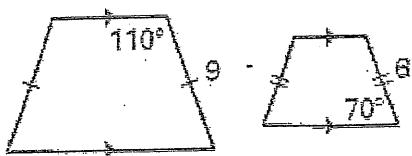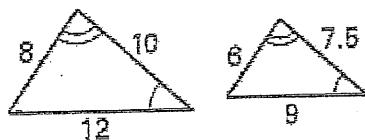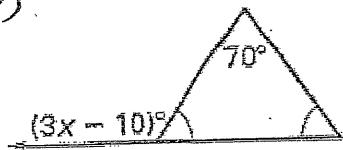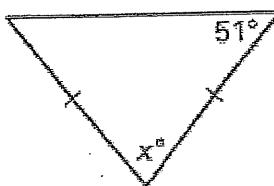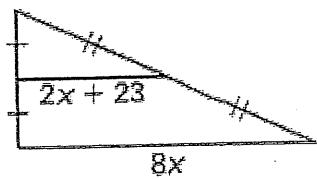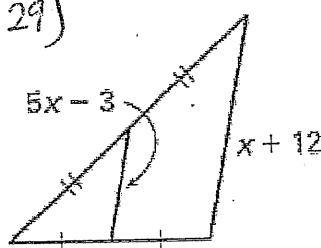
In Questions 30, 31, $\overrightarrow{BD}$ bisects $\angle ABC$. Find the value of x.
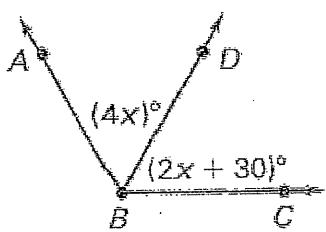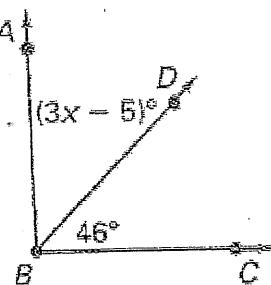
30)

A

D

$(4x)°$

$(2x + 30)°$

B

C

31)

A

D

$(3x - 5)°$

46°

B

C

Find the value of each variable. Write answers in simplest radical form.

1a)

$x = 6$

$y = 6\sqrt{2}$

1b)

$x = \dfrac{4}{\sqrt{2}} = 2\sqrt{2}$

$y = 2\sqrt{2}$

2a)

long b

short a

60 5 hyp

$a = \boxed{\dfrac{5}{2}}$

$b = \dfrac{5}{2}\sqrt{3}$ $\boxed{\dfrac{5\sqrt{3}}{2}}$

2b)

50 b hyp

$\sqrt{6}$ long

60

a short
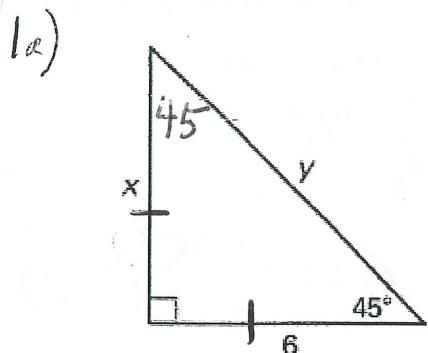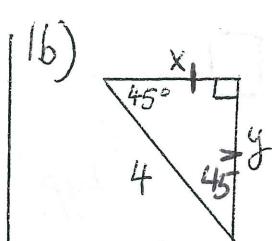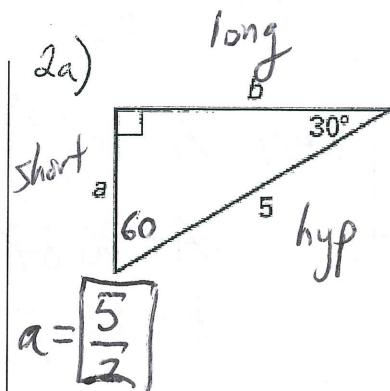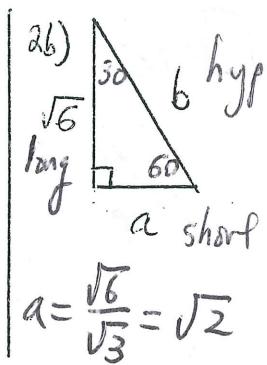
$a = \dfrac{\sqrt{6}}{\sqrt{3}} = \sqrt{2}$

$b = 2\sqrt{2}$

Find the sin, cos, and tangent of the below angles of the triangle below: (This means find the RATIO, or fractions)

3)

B hyp
opp 9 41
adj C 40 A
adj opp

Sin A = $9/41$

Cos A = $40/41$

Tan B = $40/9$

Sin B = $40/41$

Tan A = $9/40$

Use trigonometric ratios to find the value of each variable. Round decimals to the nearest tenth.

4)

hyp $x = 19.66$

8 opp

24°

$\dfrac{\sin 24}{1} = \dfrac{8}{x}$

$\dfrac{x\sin 24 = 8}{\sin 24} \quad \dfrac{}{\sin 24}$

$x = 19.66$

5)

$\dfrac{\tan 35}{1} = \dfrac{x}{17}$

opp x

35°

17

adj
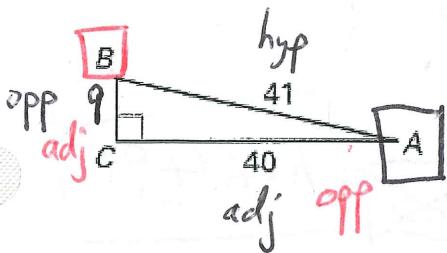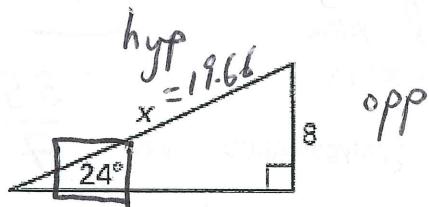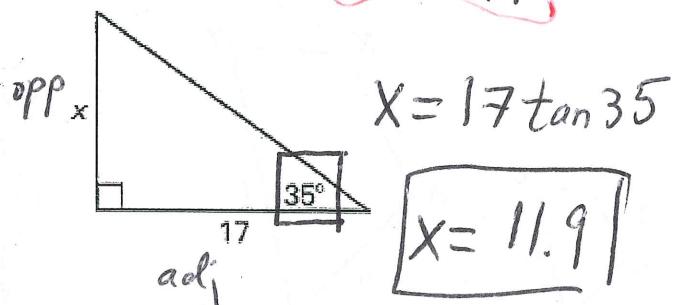
$x = 17\tan 35$

$\boxed{x = 11.9}$

Find the values of the **angle** measures A and B.

6)

adj
16
A
36.8
20
hyp
C
12 opp
B
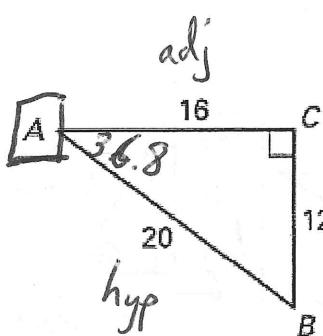
$\sin A = \frac{12}{20}$

$A = \sin^{-1}\left(\frac{12}{20}\right)$

$A = 36.87°$

$B = 53.13°$

7)
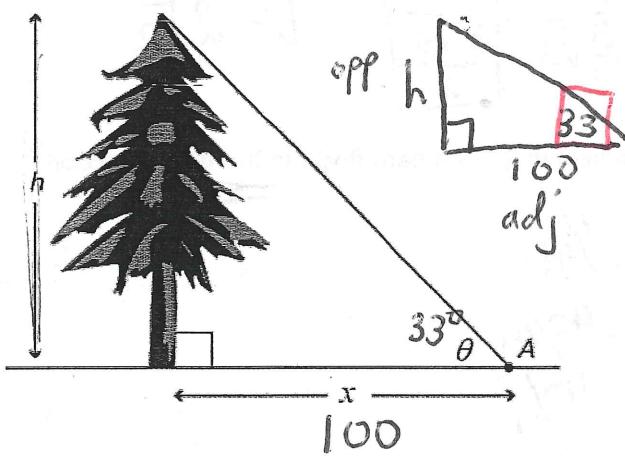
$m\angle B = 67.4°$

A
22.6°
60
65
hyp
C
25 opp
B

$\sin A = \frac{25}{65}$

$A = \sin^{-1}\left(\frac{25}{65}\right) = 22.6°$

8) John wants to measure the height of a tree. He walks exactly 100 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 33°. How tall is the tree?

opp h
33
100
adj
33°
θ
A
x
100

$\tan 33 = \frac{h}{1} \times \frac{h}{100}$

$h = 100 \tan 33$

$h = 6.5$ $h = 64.9 ft$

Find the value of x.

9)

x°
132°
109°
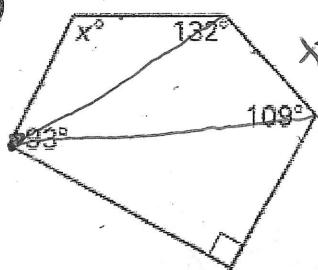
All angles = 540°

$x + 132 + 109 + 90 + 93 = 540$

$x + 424 = 540$

$\boxed{116°}$

10)

76°
52°
x°
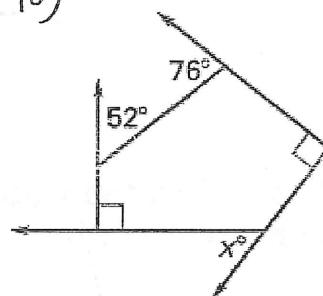
Ext. angles = 360

$x + 52 + 90 + 76 + 90 = 360$

$x + 308 = 360$

$\boxed{x = 52°}$

11)

X 9 Y
7
B 8 C
3.5
A
5
D
W
t
u
Z

original new
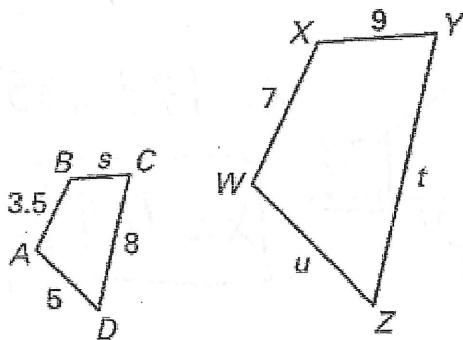
Given: ABCD ~ WXYZ

11a) Find the ratio of polygon ABCD to WXYZ

$\frac{3.5}{7}$ or $\boxed{\frac{1}{2}}$

11b) Find the scale factor of polygon ABCD to WXYZ

$\frac{7}{3.5} = \boxed{\frac{2}{1}}$

11c) Find the value of t

$\frac{3.5}{7} = \frac{8}{t}$

$\frac{3.5t}{3.5} = \frac{56}{3.5}$

$\boxed{t = 16}$

Find the value of x

12)

$(2x + 5)°$
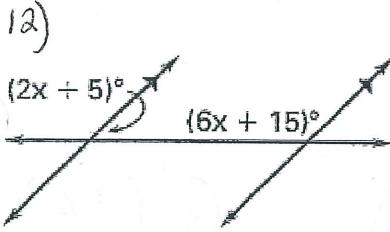
$(6x + 15)°$

$2x + 5 + 6x + 15 = 180$

$8x + 20 = 180$

$-20 \quad -20$

$\frac{8x}{8} = \frac{160}{8}$ $\boxed{x = 20}$
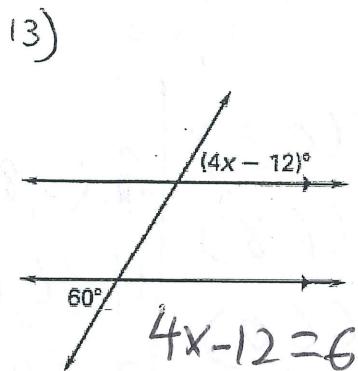
13)

$(4x - 12)°$

$60°$

$4x - 12 = 60$

$+12 \quad +12$

$\frac{4x}{4} = \frac{72}{4}$ $\boxed{x = 18}$
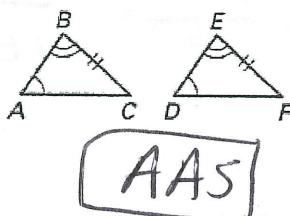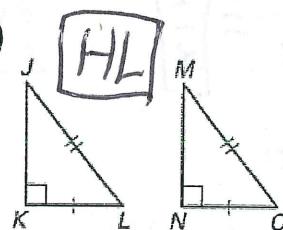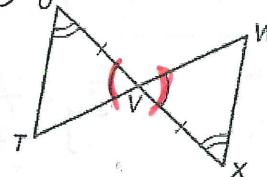
14)

$(16x + 14)°$

$70°$

$16x + 14 + 70 = 180$

$16x + 84 = 180$

$-84 \quad -84$

$\frac{16x}{16} = \frac{96}{16}$ $\boxed{x = 6}$

State the theorem used to prove the triangles are congruent.

15)

B   E

A   C   D   F

$\boxed{AAS}$

16)

J $\boxed{HL}$ M

K   L   N   O

17)

U   W

(V)

T   X

ASA

18) What is the measure of $\angle XYZ$?

(A) 142°
(B) 128°
(C) 118°
(D) 132°
(E) Cannot be determined

X

38°

W   Y   Z
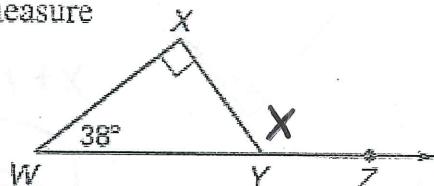
$x = 38 + 90$

$\boxed{x = 128}$

19) What is the measure of $\angle B$?

(A) 90°
(B) 38°
(C) 104°
(D) 52°
(E) Cannot be determined

B   x

A 38°   38° C

$x + 38 + 38 = 180$

$x = 104$

20) In the isosceles triangle below, find the value of x

$2x°$ $2x$

$32°$
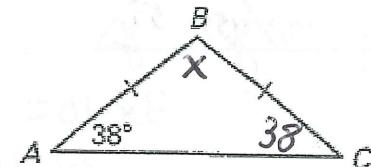
$2x + 2x + 32 = 180$

$4x + 32 = 180$

$-32 \quad -32$

$\frac{4x}{4} = \frac{148}{4}$

$\boxed{x = 37}$

21) The triangles shown are similar. Which of the following is *not* a correct statement?
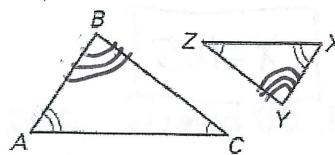
B   Z   X

A   Y   C

(A) $\frac{AB}{XY} = \frac{BC}{YZ}$ ✓
(B) $\triangle ABC \sim \triangle XYZ$ ✓
(C) $\frac{BC}{YZ} = \frac{AC}{XY}$ ✗
(D) $\frac{CA}{ZX} = \frac{BA}{YX}$ ✓
(E) $\frac{AC}{XZ} = \frac{AB}{XY}$ ✓

Use the origin as the center of the dilation and the given scale factor to find the coordinates of the vertices of the image of the polygon.

22) $k = 2$

$M(0,4)$
$N(3,4)$
$L(3,0)$
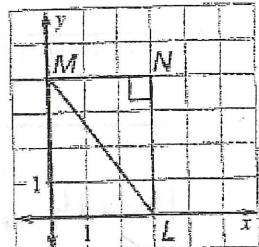
$M'(0,8)$
$N'(6,8)$
$L'(6,0)$

23) $k = \frac{1}{2}$

$G(2,8)$
$H(6,6)$
$I(4,2)$
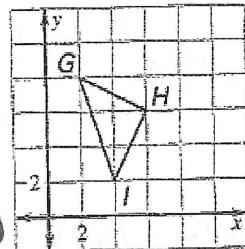
$G'(1,4)$
$H'(3,3)$
$I'(2,1)$

The two polygons are similar. Find the scale factor. (8.3)

24)

110° 9 · 6 70°

$\frac{6}{9} = \boxed{\frac{2}{3}}$

25)

8 10 12 · 6 7.5 9

$\frac{7.5}{10} = \boxed{\frac{3}{4}}$

Find x:

26)

70°
$(3x - 10)°$ 55 55

$2y + 70 = 180$
$\quad -70 \quad -70$
$2y = 110$
$y = 55$

$3x - 10 = 70 + 55$
$3x - 10 = 125$
$3x = 135$
$\boxed{x = 45}$

27)
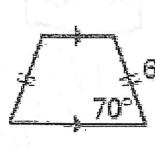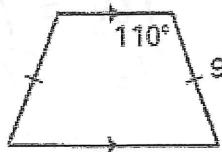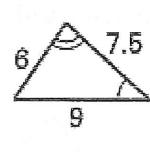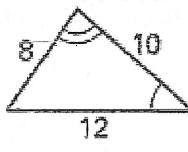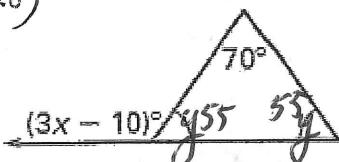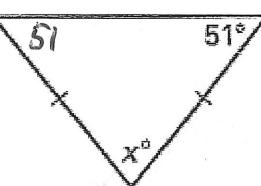
51 51°
$x°$

$x + 51 + 51 = 180$
$x + 102 = 180$
$\boxed{x = 78}$

28)

$2x + 23$
$8x$

$2(2x + 23) = 8x$
$4x + 46 = 8x$
$-4x \quad -4x$
$\frac{46}{4} = \frac{4x}{4}$
$\boxed{x = 11.5}$

29)

$5x - 3$
$x + 12$
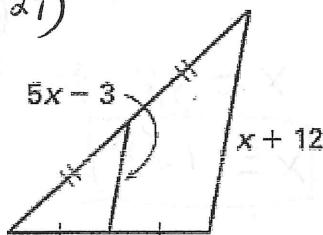
$2(5x - 3) = x + 12$
$10x - 6 = x + 12$
$-1x \quad -1x$
$9x - 6 = 12$
$\quad +6 \quad +6$
$\frac{9x}{9} = \frac{18}{9}$
$\boxed{x = 2}$

In Questions 21–23, $\overline{BD}$ bisects $\angle ABC$. Find the value of x.

30)

A D
$(4x)°$
$(2x + 30)°$
B C
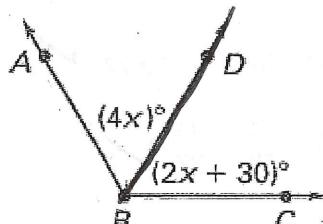
$4x = 2x + 30$
$-2x \quad -2x$
$\frac{2x}{2} = \frac{30}{2}$ $\boxed{x = 15}$

31)

A
D
$(3x - 5)°$
46°
B C

$3x - 5 = 46$
$\quad +5 \quad +5$
$3x = 51$
$\boxed{x = 17}$