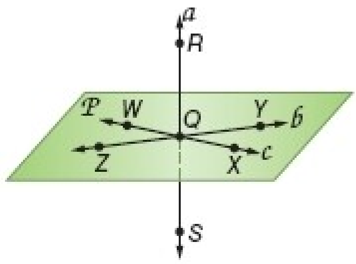
Practice Test - Chapter 1

Use the figure to name each of the following.



1. the line that contains points Q and Z

SOLUTION:

The points Q and Z lie on the line b, $\overleftrightarrow{ZQ}, \overleftrightarrow{ZY}$, or $\overleftrightarrow{QY}$.

ANSWER:
line b

2. two points that are coplanar with points W, X, and Y

SOLUTION:
Coplanar points are points that lie in the same plane. Here, the points W, X, and Y lie in plane P. So, the points on the plane P are coplanar with points W, X, and Y.
The points Q and Z are coplanar with the points W, X, and Y.

ANSWER:
points Q and Z

3. the intersection of lines a and b

SOLUTION:
The two lines a and b intersect at the point Q on the plane P.

ANSWER:
point Q

Find the value of the variable if *P* is between *J* and *K*.

4. $JP = 2x$, $PK = 7x$, $JK = 27$

SOLUTION:

Here P is between J and K. So, $JK = JP + PK$.
We have $JP = 2x$, $PK = 7x$, and $JK = 27$.

$JK = JP + PK$	Betweenness of Points.
$27 = 2x + 7x$	Substitution.
$27 = 9x$	Simplify.
$\frac{27}{9} = \frac{9x}{9}$	Divide each side by 9.
$3 = x$	Simplify.

ANSWER:

3

5. $JP = 3y + 1$, $PK = 12y - 4$, $JK = 75$

SOLUTION:

Here P is between J and K. So, $JK = JP + PK$.
We have $JP = 3y + 1$, $PK = 12y - 4$, and $JK = 75$.

$JK = JP + PK$	Betweenness of Points.
$75 = (3y + 1) + (12y - 4)$	Substitution.
$75 = 15y - 3$	Simplify.
$75 + 3 = 15y - 3 + 3$	Add 3 to each side.
$78 = 15y$	Simplify.
$\frac{78}{15} = \frac{15y}{15}$	Divide each side by 15.
$5.2 = y$	Simplify.

ANSWER:

5.2

6. $JP = 8z - 17$, $PK = 5z + 37$, $JK = 17z - 4$

SOLUTION:

Here P is between J and K. So, $JK = JP + PK$.
We have $JP = 8z - 17$, $PK = 5z + 37$, and $JK = 17z - 4$.

$$
\begin{aligned}
JK &= JP + PK && \text{Betweenness of Points.}\\
17z - 4 &= (8z - 17) + (5z + 37) && \text{Substitution.}\\
17z - 4 &= 13z + 20 && \text{Simplify.}\\
17z - 13z - 4 &= 13z - 13z + 20 && -13z \text{ from each side.}\\
4z - 4 &= 20 && \text{Simplify.}\\
4z - 4 + 4 &= 20 + 4 && +4 \text{ to each side.}\\
4z &= 24 && \text{Simplify.}\\
\frac{4z}{4} &= \frac{24}{4} && \div \text{ each side by 4.}\\
z &= 6 && \text{Simplify.}
\end{aligned}
$$

ANSWER:

6

Find the coordinates of the midpoint of a segment with the given endpoints.

7. (16, 5) and (28, –13)

SOLUTION:

Use the Midpoint Formula $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.

Substitute.

$$\left(\frac{16+28}{2}, \frac{5+(-13)}{2}\right) = (22, -4)$$

The mid point of the segment is (22, –4).

ANSWER:

(22, –4)

8. (–11, 34) and (47, 0)

SOLUTION:

Use the Midpoint Formula $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

Substitute.

$$\left(\frac{-11+47}{2}, \frac{34+0}{2}\right) = (18, 17)$$

The mid point of the segment is (18, 17).

ANSWER:

(18, 17)

9. (–4, –14) and (–22, 9)

SOLUTION:

Use the Midpoint Formula $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

Substitute.

$$\left(\frac{-4+(-22)}{2}, \frac{-14+9}{2}\right) = (-13, -2.5)$$

The mid point of the segment is (–13, –2.5).

ANSWER:

(–13, –2.5)

Find the distance between each pair of points.

10. (43, –15) and (29, –3)

SOLUTION:

Use the Distance Formula.

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Substitute.

$$\begin{aligned} D &= \sqrt{(29-43)^2 + (-3-(-15))^2} \\ &= \sqrt{(-14)^2 + (12)^2} \\ &= \sqrt{196+144} \\ &= \sqrt{340} \\ &\approx 18.4 \end{aligned}$$

The distance between the two points is about 18.4 units.

ANSWER:

$\sqrt{340}$ or 18.4 units

11. (21, 5) and (28, –1)

SOLUTION:

Use the Distance Formula.

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Substitute.

$$\begin{aligned} D &= \sqrt{(28-21)^2 + (-1-5)^2} \\ &= \sqrt{(7)^2 + (-6)^2} \\ &= \sqrt{49+36} \\ &= \sqrt{85} \\ &\approx 9.2 \end{aligned}$$

The distance between the two points is about 9.2 units.

ANSWER:

$\sqrt{85}$ or 9.2 units

12. (0, –5) and (18, –10)

SOLUTION:
Use the Distance Formula.

$$D=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

Substitute.

$$\begin{aligned}D&=\sqrt{(18-0)^2+(-10-(-5))^2}\\&=\sqrt{(18)^2+(-5)^2}\\&=\sqrt{324+25}\\&=\sqrt{349}\\&\approx 18.7\end{aligned}$$

The distance between the two points is about 18.7 units.

ANSWER:
$\sqrt{349}$ or 18.7 units

13. **ALGEBRA** The measure of $\angle X$ is 18 more than three times the measure of its complement. Find the measure of $\angle X$.

SOLUTION:
Complementary angles are two angles with measures that have a sum of 90.

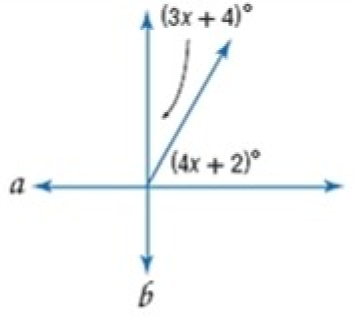
Let x be the measure of $\angle X$. Then the measure of the complement of $\angle X$ is 90 – x. The measure of $\angle X$ is 18 more than three times the measure of its complement. So, x = 3(90 – x) + 18.

$$\begin{aligned}x&=3(90-x)+18.\\x&=270-3x+18\\4x&=288\\x&=72\end{aligned}$$

Therefore, the measure of $\angle X$ is 72.

ANSWER:
72

14. Find the value of x that will make lines a and b perpendicular in the figure below.



SOLUTION:

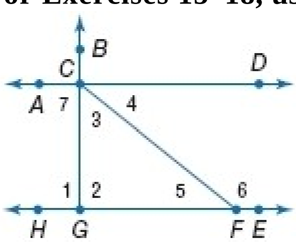
The lines a and b will be perpendicular to each other if the sum of the measures of $(3x+4)°$ and $(4x+2)°$ is 90°.

$$\begin{aligned}(3x + 4) + (4x + 2) &= 90\\ 7x + 6 &= 90\\ 7x &= 84\\ x &= 12\end{aligned}$$

ANSWER:

12

For Exercises 15–18, use the figure below.



15. Name the vertex of $\angle 3$.

SOLUTION:

Here, $\angle 3$ is same as the angle GCF. So, the vertex of the angle is C.

ANSWER:

point C

16. Name the sides of $\angle 1$.

SOLUTION:

Here, $\angle 1$ is same as the $\angle HGB$. Therefore, its sides are $\overrightarrow{GH}$ and $\overrightarrow{GB}$.

ANSWER:

$\overrightarrow{GH}$ and $\overrightarrow{GB}$

17. Write another name for $\angle 6$.

SOLUTION:

Here, $\angle 6$ is same as the $\angle EFC$ or $\angle CFE$.

ANSWER:

$\angle EFC$ or $\angle CFE$

18. Name a pair of angles that share exactly one point.

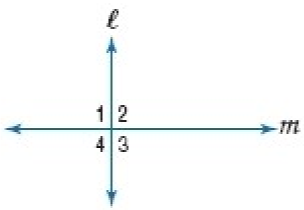
SOLUTION:

Here, $\angle 7$ and $\angle 4$ share exactly one point.

ANSWER:

$\angle 7$ and $\angle 4$

19. **MULTIPLE CHOICE** If $m\angle 1 = m\angle 2$, which of the following statements is true?



A $\angle 2 \cong \angle 4$
B $\angle 2$ is a right angle.
C $\ell \perp m$
D All of the above

SOLUTION:

We have $m\angle 1 + m\angle 2 = 180$. Since $m\angle 1 = m\angle 2$, each of the angles measures 90°. So, the statements in options B and C are true. Since $\angle 2$ and $\angle 4$ are vertical angles, they are congruent. So, the statement in option A is also true. That is, the statements in options A, B, and C are true. Therefore, the correct choice is D.

ANSWER:

D

Find the perimeter of each polygon.

20. triangle *XYZ* with vertices *X*(3, 7), *Y*(–1, –5), and *Z*(6, –4)

SOLUTION:

The perimeter of a triangle is the sum of the lengths of the sides.
Find the lengths of the sides of the triangle.

Use the Distance Formula.

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Substitute.

$$\begin{aligned} XY &= \sqrt{(-1-3)^2 + (-5-7)^2} \\ &= \sqrt{(-4)^2 + (-12)^2} \\ &= \sqrt{160} \\ &\approx 12.6 \end{aligned}$$

$$\begin{aligned} YZ &= \sqrt{(6-(-1))^2 + (-4-(-5))^2} \\ &= \sqrt{(7)^2 + (1)^2} \\ &= \sqrt{50} \\ &\approx 7.1 \end{aligned}$$

$$\begin{aligned} ZX &= \sqrt{(3-6)^2 + (7-(-4))^2} \\ &= \sqrt{(-3)^2 + (11)^2} \\ &= \sqrt{130} \\ &\approx 11.4 \end{aligned}$$

Therefore, perimeter is about 12.6 + 7.1 + 11.4 = 31.1 units.

ANSWER:

31.1 units

21. rectangle *PQRS* with vertices *P*(0, 0), *Q*(0, 7), *R*(12, 7), and *S*(12, 0)

SOLUTION:

The perimeter of a rectangle of length ℓ and width *w* is $2\ell + 2w$.
Find the length of the rectangle.

Use the Distance Formula.

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Substitute.

$$\begin{aligned} PQ &= \sqrt{(0-0)^2 + (7-0)^2} \\ &= \sqrt{(0)^2 + (7)^2} \\ &= 7 \end{aligned}$$

$$\begin{aligned} QR &= \sqrt{(12-0)^2 + (7-7)^2} \\ &= \sqrt{(12)^2 + (0)^2} \\ &= 12 \end{aligned}$$

Therefore, perimeter is 2(7) + 2(12) = 38 units.

ANSWER:

38 units

22. **SAFETY** A severe weather siren in a local city can be heard within a radius of 1.3 miles. If the mayor of the city wants a new siren that will cover double the area of the old siren, what should the radius of the coverage area of the new siren be? Round to the nearest tenth of a mile.

SOLUTION:

Find the area covered by the siren of radius 1.3 miles.
The area of a circle with radius *r* units is given by the formula $A = \pi r^2$.

So, the area covered by the siren is

$$\begin{aligned}\pi(1.3)^2 &= 1.69\pi \\ &\approx 5.3\end{aligned}$$

The new siren will cover double the area of the old, that is, about 10.6 mi^2. Find the radius of the circle whose area is 10.6.

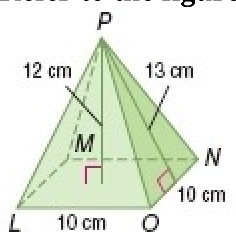
$$\begin{aligned}10.6 &= \pi r^2 \\ r &= \sqrt{\frac{10.6}{\pi}} \\ &\approx 1.8\end{aligned}$$

Therefore, the radius of the coverage area of the new siren should be about 1.8 mi.

ANSWER:

1.8 mi

Refer to the figure at the right.



23. Name the base.

SOLUTION:

The base of the pyramid is a square with sides $\overline{LM}, \overline{MN}, \overline{NO}$, and $\overline{OL}$. Therefore, the base is $\square LMNO$.

ANSWER:

$\square LMNO$.

24. Find the surface area.

SOLUTION:

The surface area of a pyramid of regular base with an area *B*, base perimeter *P*, and slant height ℓ is given by the formula

$$A = \frac{1}{2}P\ell + B.$$

Here, the height of the pyramid is 12 cm, each side of the base is 10 cm, and the slant height of the pyramid is 13 cm. So, the area is

$$\begin{aligned} A &= \frac{1}{2}4(10)(13) + (10)^2 \\ &= 360 \text{ cm}^2. \end{aligned}$$

The surface area of the pyramid is 360 cm^2.

ANSWER:

360 cm^2

25. Find the volume.

SOLUTION:

The volume of a pyramid of base area *B* and height *h* is given by the formula,

$$V = \frac{1}{3}Bh.$$

Here, the length of each side of the base of the pyramid is 10 cm and the height is 12 cm. So, the volume is

$$\begin{aligned} V &= \frac{1}{3}(10)^2(12) \\ &= 400 \text{ cm}^3. \end{aligned}$$

The volume of the pyramid is 400 cm^3.

ANSWER:

400 cm^3