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Study Guide for Exam-5: Tools of Geometry

Exam-5

Point 1 (x_1, y_1) *Point* 2 (x_2, y_2)

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

Distance Formula

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

Angle Bisector Theorem

- If a point is on the bisector of an angle, then it is equidistant from the two sides of the angle. ***(Cut angle into half)***

Find the distance and midpoint for the points (4, 8) and (19, 16).

The distance is 17.

The midpoint is $\left(\frac{23}{2}, 12\right)$.

Apply the distance formula.

$$\sqrt{(19-4)^2 + (16-8)^2} = \sqrt{225 + 64} = 17$$

Apply the midpoint formula.

$$\left(\frac{(4+19)}{2}, \frac{(8+16)}{2}\right) = \left(\frac{23}{2}, 12\right).$$

2

The ray $\overrightarrow{GJ}$ is the angle bisector of $\angle FGH$ and $m\angle FGH = 55°$. Enter $m\angle FGJ$.

The measure of $\angle FGJ$ is 27.5 °.

so it divides the angle into two angles of equal measure.

$$\frac{55}{2} = 27.5$$

3

The ray $\overrightarrow{XZ}$ is the angle bisector of $\angle WXY$ and $m\angle WXY = 110°$. Enter $m\angle WXZ$.

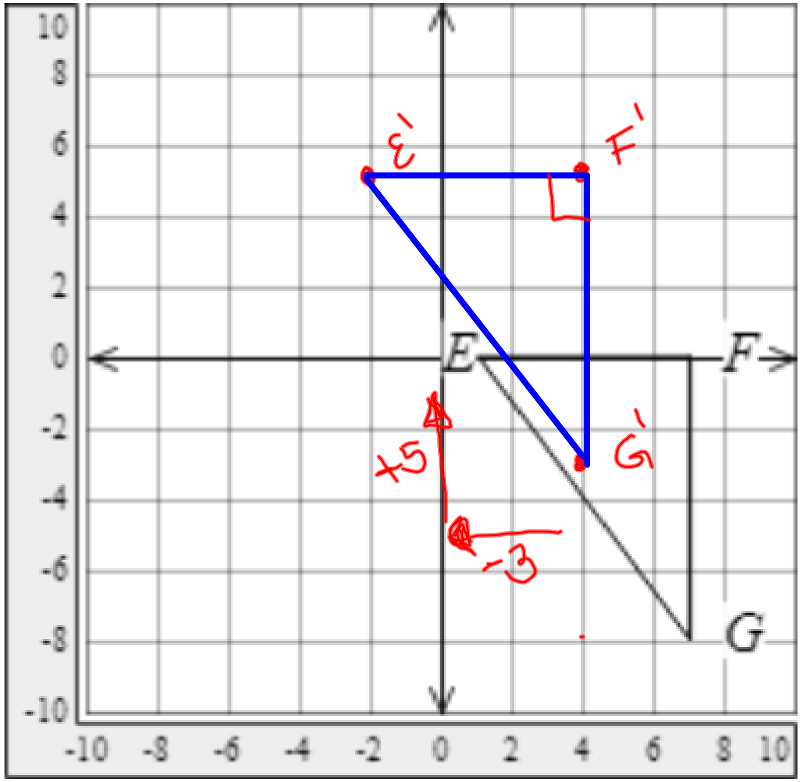
The measure of $\angle WXZ$ is 55 °.

so it divides the angle into two angles of equal measure.

$$\frac{110}{2} = 55$$

4 Given triangle EFG, select the graph of image E F G and confirm that it preserves length and angle measures.

$(x, y) \rightarrow (x - 3, y + 5)$



□ = 2 units

3x2 4x2 5x2

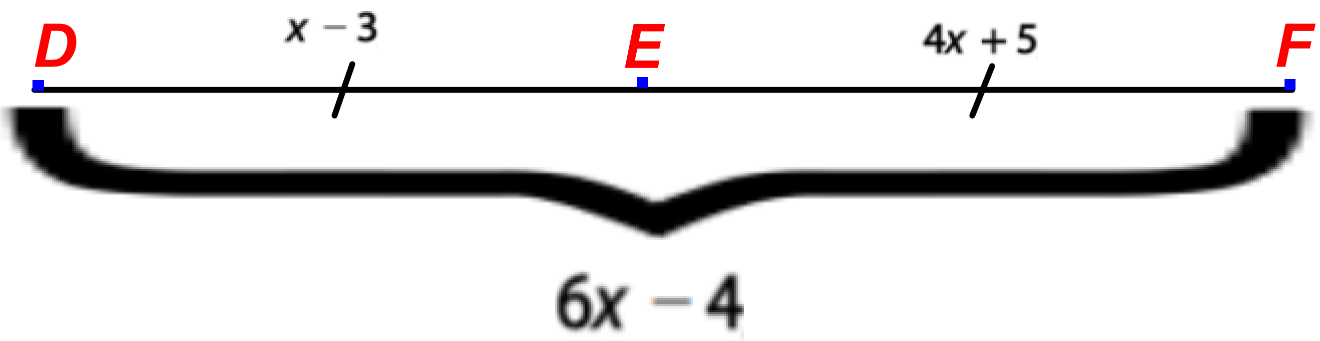
$EF = E'F' =$ 6 , $FG = F'G' =$ 8 , and $GE = G'E' =$ 10

$m\angle F = m\angle F' =$ 90 °, $m\angle E = m\angle E' =$ 53 °, and $m\angle G = m\angle G' =$ 37 °

5 Use a definition, postulate, or theorem to find the value of x in the figure described.

Point E is between points D and F. If $DE = x - 3$, $EF = 4x + 5$, and $DF = 6x - 4$, find x.

The solution is $x =$ 6 .



$$DE + EF = DF$$

$$(x - 3) + (4x + 5) = 6x - 4$$

$$5x + 2 = 6x - 4$$

$$6 = x$$

6

Use a definition, postulate, or theorem to find the value of x in the figure described.

Y is the midpoint of $\overline{XZ}$. If $XZ = 8x - 2$ and $YZ = 3x + 2$, find x.

Select each definition, postulate, or theorem you will use.

- **A** Segment Addition Postulate
- **B** definition of segment bisector
- **C** Linear Pair Theorem
- **D** definition of a midpoint

Same

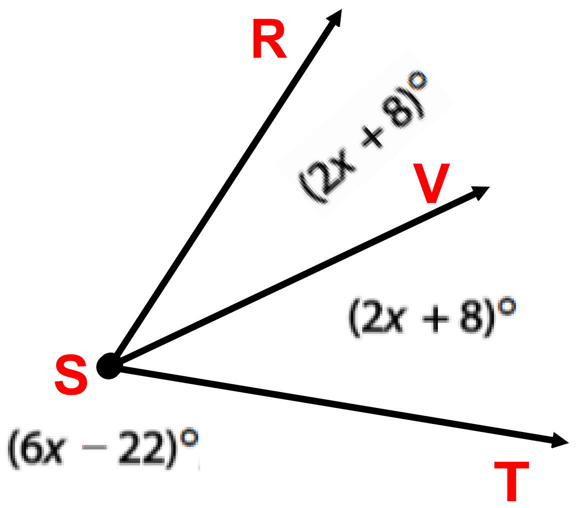
$$XY + YZ = XZ$$
$$(3x + 2) + (3x + 2) = 8x - 2$$
$$6x + 4 = 8x - 2$$
$$6 = 2x$$
$$3 = x$$

The solution is $x =$ 3.

7 Use a definition, postulate, or theorem to find the value of x in the figure described.

$\overline{SV}$ is an angle bisector of $\angle RST$. If $m\angle RSV = (2x+8)°$ and $m\angle RST = (6x-22)°$, find x.

The solution is $x =$ 19 .



Same

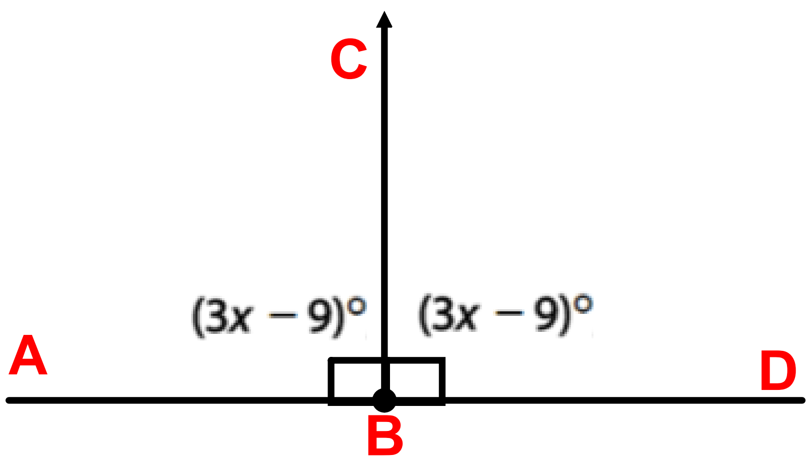
$$m\angle RSV + m\angle TSV = m\angle RST$$
$$(2x+8) + (2x+8) = 6x - 22$$
$$4x + 16 = 6x - 22$$
$$38 = 2x$$
$$19 = x$$

8

Use a definition, postulate, or theorem to find the value of x in the figure described.

$\angle ABC$ and $\angle CBD$ are a linear pair. If $m\angle ABC = m\angle CBD = (3x-9)^\circ$, find x.

The solution is $x =$ 33 .



$$
\begin{aligned}
m\angle ABC + m\angle CBD &= 180^\circ \\
(3x-9)^\circ + (3x-9)^\circ &= 180^\circ \\
6x - 18 &= 180 \\
6x &= 198 \\
x &= 33
\end{aligned}
$$

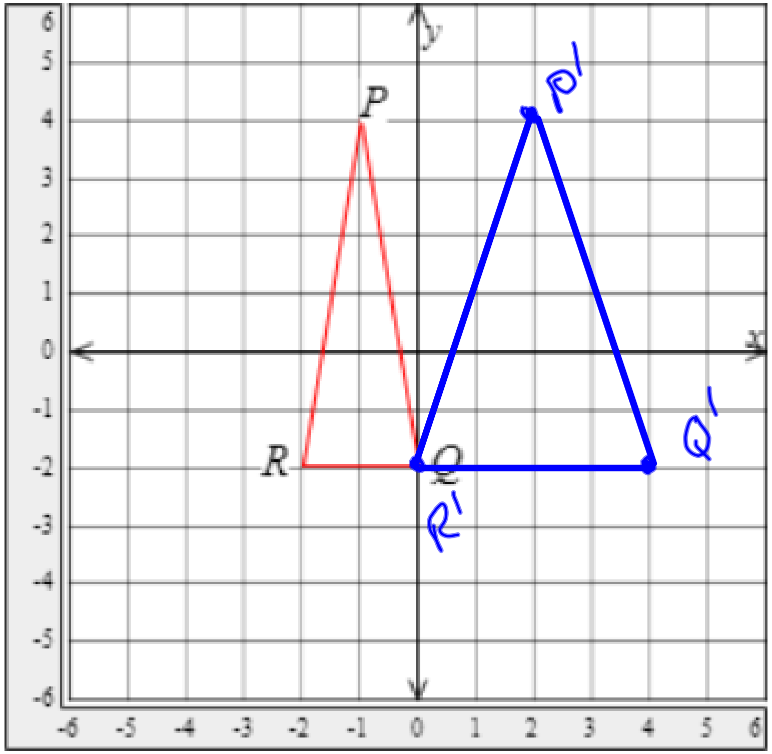
9

Drag and drop each description of a transformation next to the appropriate coordinate notation.

$(x, y) \longrightarrow (3x, y)$	horizontal stretch by a factor of 3
$(x, y) \longrightarrow (x + 3, y)$	translation 3 units right
$(x, y) \longrightarrow (x, 3y)$	vertical stretch by a factor of 3
$(x, y) \longrightarrow (x, y + 3)$	translation 3 units up
$(x, y) \longrightarrow (3x, 3y)$	dilation with scale factor 3

10 Draw the image of the figure under the given transformation. Then describe the transformation as a rigid motion or not a rigid motion by completing the justification.

$(x, y) \rightarrow (2x + 4, y)$



P (-1, 4) → P' (2(-1) + 4, 4)

Q (0, -2) → Q' (2(0) + 4, -2)

R (-2, -2) → R' (2(-2) + 4, -2)

P' (2, 4)

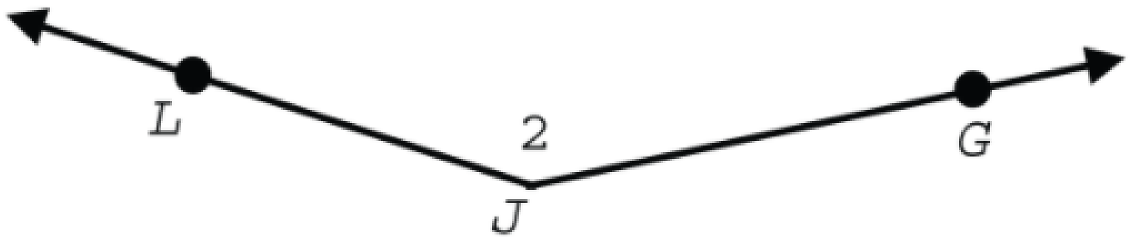
Q' (4, -2)

R' (0, -2)

Since QR ≠ ▼ $Q'R'$, the transformation is not ▼ a rigid motion.

11

Name each angle in as many different ways as possible.



∠ J ∠ LJG ∠ GJL ∠ 2

An angle is a figure formed by two rays with the same endpoint. The common endpoint is the vertex of the angle. The rays are the sides of the angle.

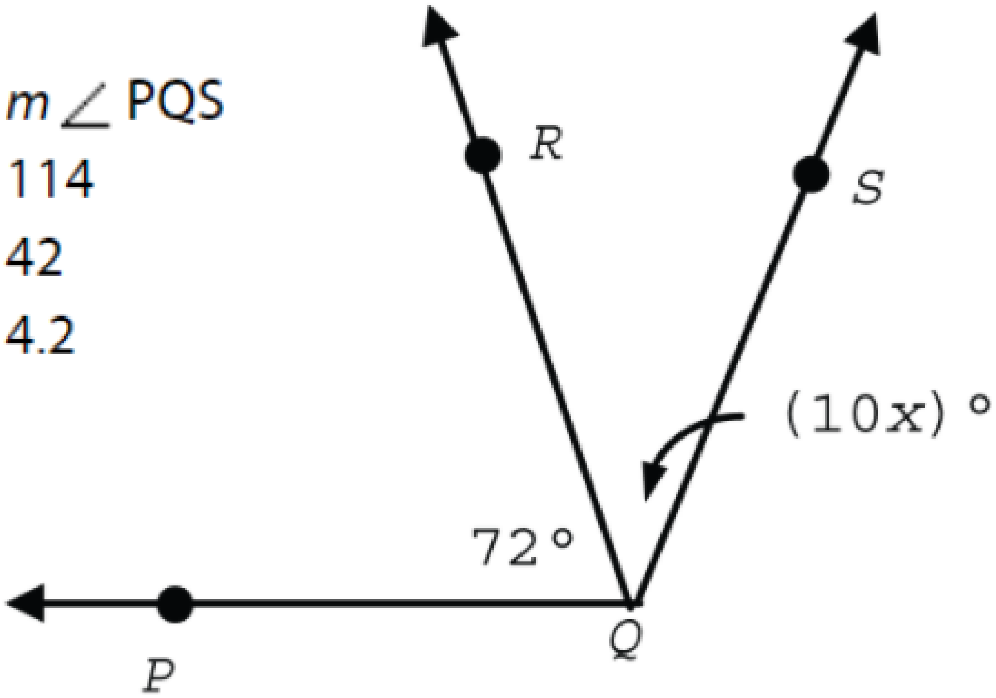
The vertex of the angle shown is point J. A name for the angle is ∠ J.
The vertex must be in the middle, so two more names for the angle are ∠ LJG and ∠ GJL.
The angle is numbered, so another name is ∠ 2.

12

Find the value of x, given that $m\angle PQS = 114°$.
Round the answer to one decimal place if necessary.

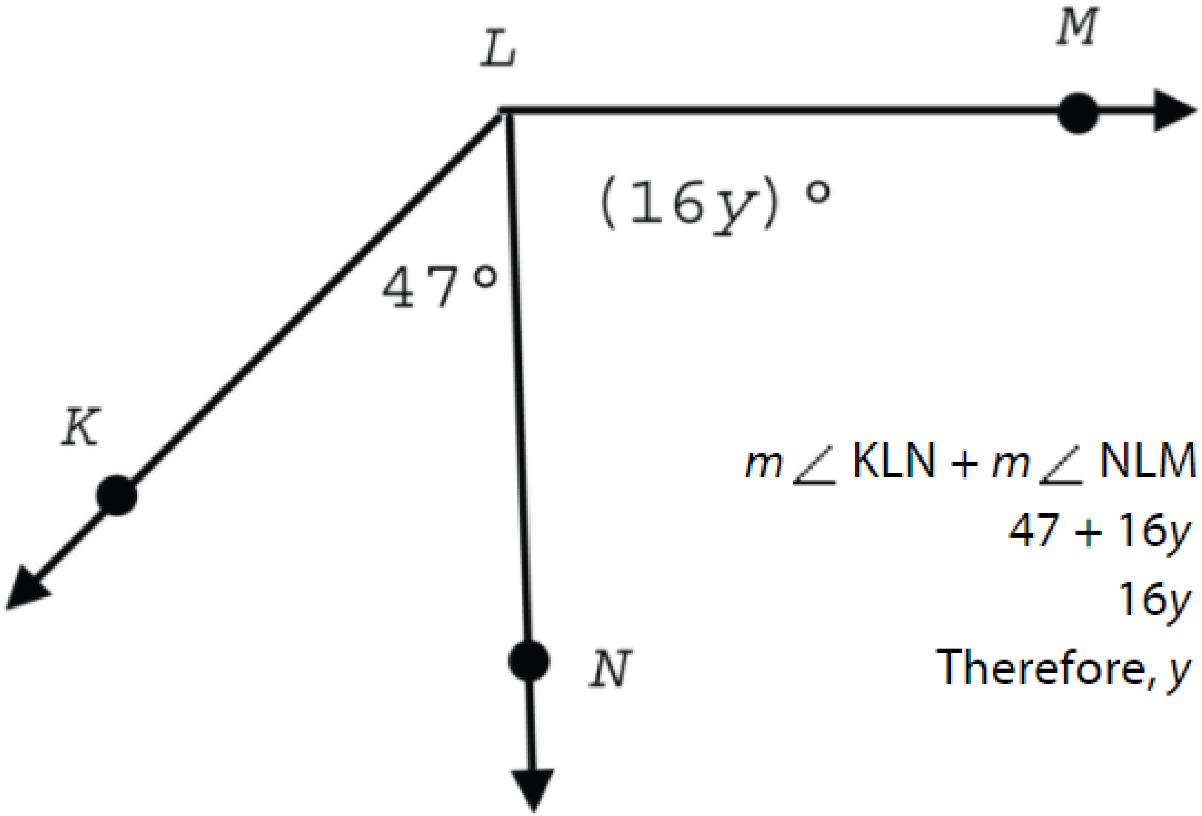
$$
\begin{aligned}
m\angle PQR + m\angle RQS &= m\angle PQS \\
72 + 10x &= 114 \\
10x &= 42 \\
x &= 4.2
\end{aligned}
$$

$x =$ 4.2



13

Find the value of y, given that $m\angle KLM = 135°$.
Round the answer to two decimal places if necessary.

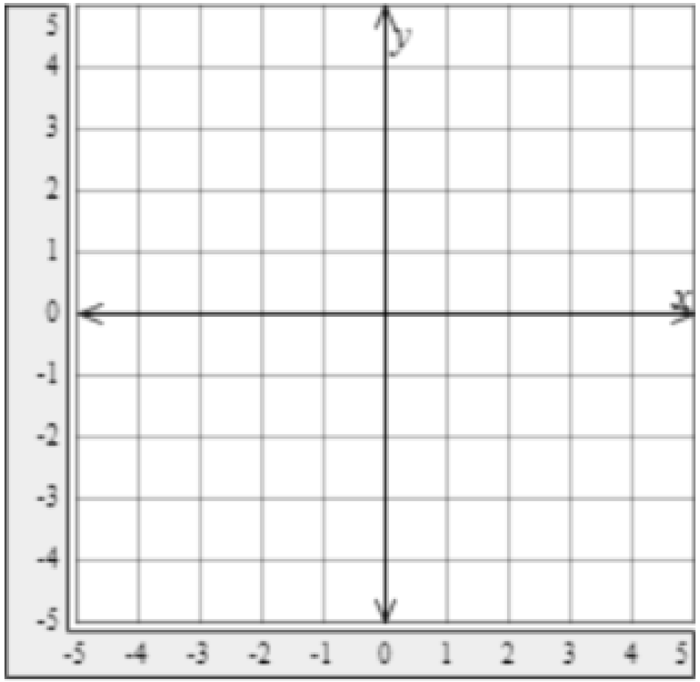


$$m\angle KLN + m\angle NLM = m\angle KLM$$
$$47 + 16y = 135$$
$$16y = 88$$
$$\text{Therefore, } y = 5.5.$$

$y =$ 5.5

14

Select the term that is suggested by the figure. Then state whether the term is an undefined term or a defined term.



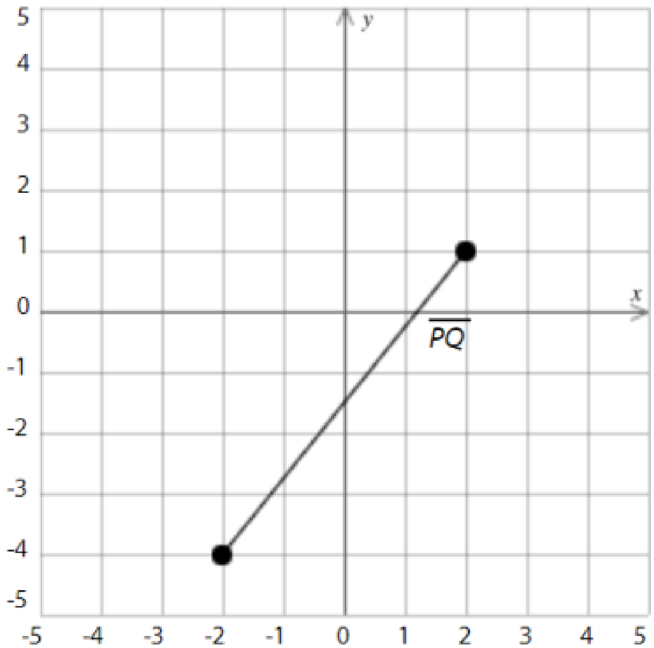
*The image shows a flat surface. It has no thickness and it extends forever in all directions. The term that defines this is a plane or line, which is an undefined term.

The image suggests the term [plane or line ▾], which is [an undefined ▾] term.

15

Plot the segment $\overline{PQ}$ with endpoints $P(-2, -4)$ and $Q(2, 1)$ on the coordinate plane. Then find the length and midpoint of $\overline{PQ}$. Enter the midpoint coordinates as a decimal if necessary.

Plot the segment $\overline{PQ}$ with endpoints $P(-2, -4)$ and $Q(2, 1)$ on the coordinate plane.



The length of $\overline{PQ}$ is $\sqrt{41}$.

The midpoint of $\overline{PQ}$ is $M(0, -1.5)$

$$
\begin{aligned}
\overline{PQ} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
&= \sqrt{(2 - (-2))^2 + (1 - (-4))^2} \\
&= \sqrt{(4)^2 + (5)^2} \\
&= \sqrt{16 + 25} \\
&= \sqrt{41}
\end{aligned}
$$

$$
\begin{aligned}
&= M\left(\frac{(-2) + 2}{2}, \frac{(-4) + 1}{2}\right) \\
&= M\left(\frac{0}{2}, \frac{-3}{2}\right) \\
&= M(0, -1.5)
\end{aligned}
$$


Never say,
"I can't"
Always say,
"I'll try"