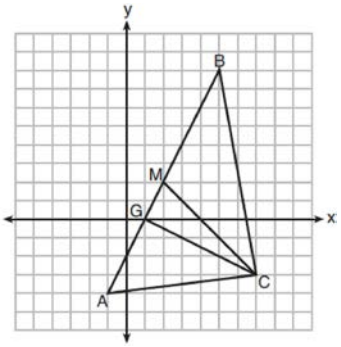
Name: _____

G.GPE.B.4: Triangles in the Coordinate Plane

1 On the set of axes below, $\triangle ABC$, altitude $\overline{CG}$, and median $\overline{CM}$ are drawn.

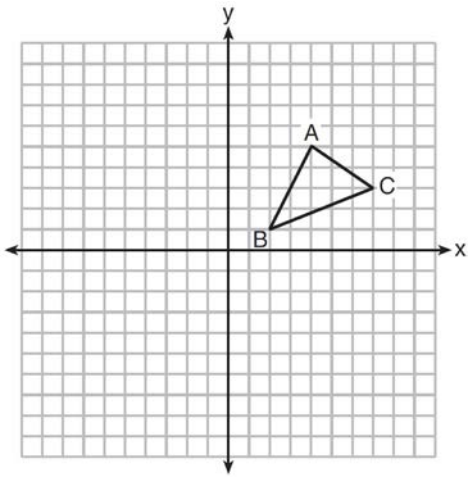


Which expression represents the area of $\triangle ABC$?

1) $\frac{(BC)(AC)}{2}$ 2) $\frac{(GC)(BC)}{2}$ 3) $\frac{(CM)(AB)}{2}$

4) $\frac{(GC)(AB)}{2}$

2 In the diagram below, $\triangle ABC$ has vertices $A(4,5)$, $B(2,1)$, and $C(7,3)$.



What is the slope of the altitude drawn from A to $\overline{BC}$?

1) $\frac{2}{5}$ 2) $\frac{3}{2}$ 3) $-\frac{1}{2}$ 4) $-\frac{5}{2}$

3 The coordinates of the vertices of $\triangle RST$ are $R(-2,-3)$, $S(8,2)$, and $T(4,5)$. Which type of triangle is $\triangle RST$?

1) right 2) acute 3) obtuse 4) equiangular

4 Triangle ABC has vertices $A(0,0)$, $B(3,2)$, and $C(0,4)$. The triangle may be classified as

1) equilateral 2) isosceles 3) right
4) scalene

5 Which type of triangle can be drawn using the points $(-2,3)$, $(-2,-7)$, and $(4,-5)$?

1) scalene 2) isosceles 3) equilateral 4) no triangle can be drawn

6 If the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-2,8)$, and $C(-5,6)$, then $\triangle ABC$ is classified as

1) right 2) scalene 3) isosceles
4) equilateral

7 The vertices of $\triangle ABC$ are $A(-1,-2)$, $B(-1,2)$ and $C(6,0)$. Which conclusion can be made about the angles of $\triangle ABC$?

1) $m\angle A = m\angle B$ 2) $m\angle A = m\angle C$
3) $m\angle ACB = 90$ 4) $m\angle ABC = 60$

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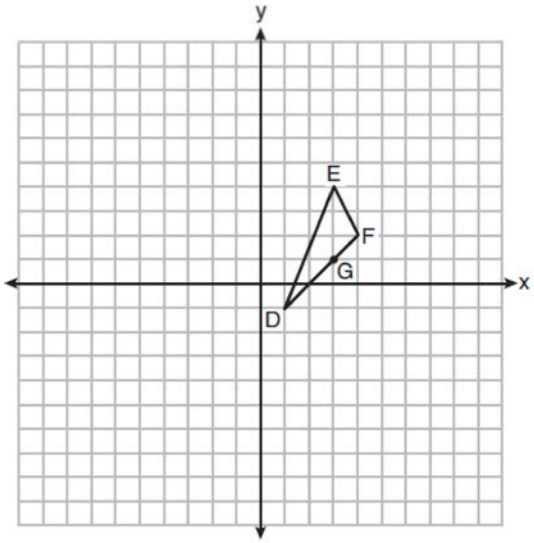
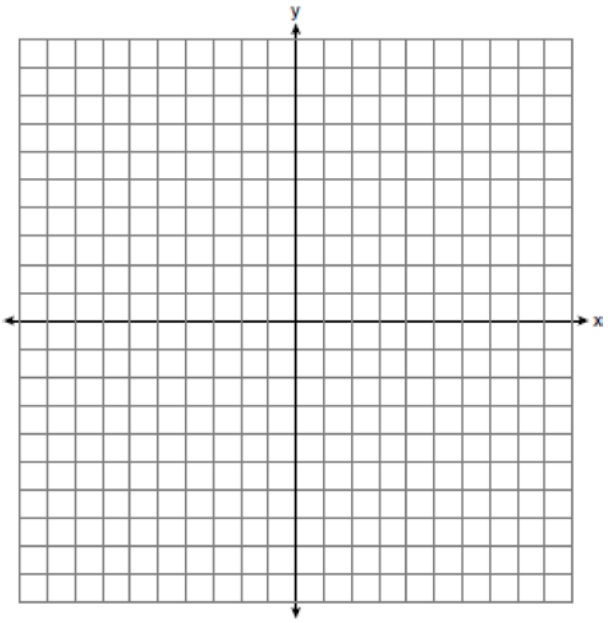
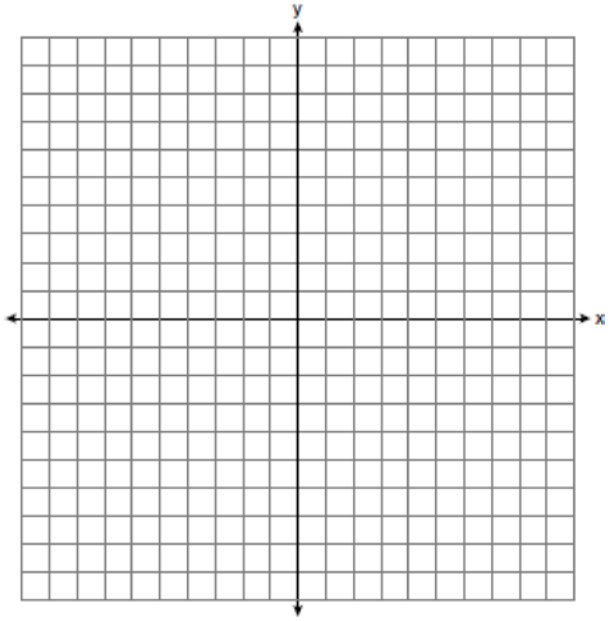
8 On the set of axes below, $\triangle DEF$ has vertices at the coordinates $D(1,-1)$, $E(3,4)$, and $F(4,2)$, and point G has coordinates $(3,1)$. Owen claims the median from point E must pass through point G. Is Owen correct? Explain why.



9 Triangle RST has vertices with coordinates $R(-3,-2)$, $S(3,2)$ and $T(4,-4)$. Determine and state an equation of the line parallel to $\overline{RT}$ that passes through point S. [The use of the set of axes below is optional.]

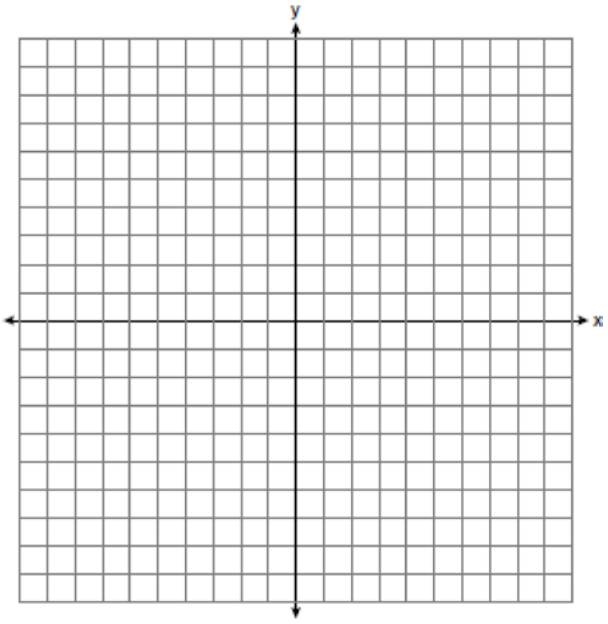


10 Given: Triangle RST has coordinates $R(-1,7)$, $S(3,-1)$, and $T(9,2)$
Prove: $\triangle RST$ is a right triangle
[The use of the set of axes below is optional.]

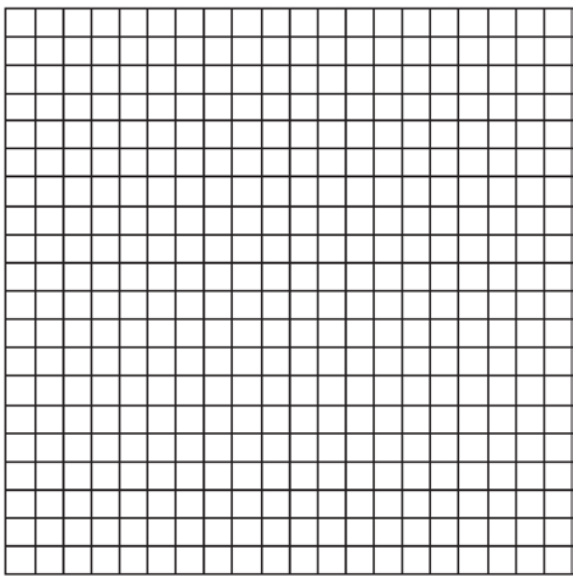


Name: _____

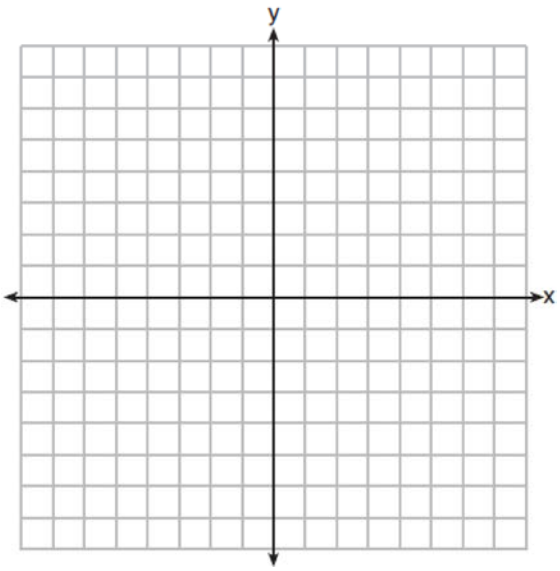
11 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$. Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle. [The use of the set of axes below is optional.]



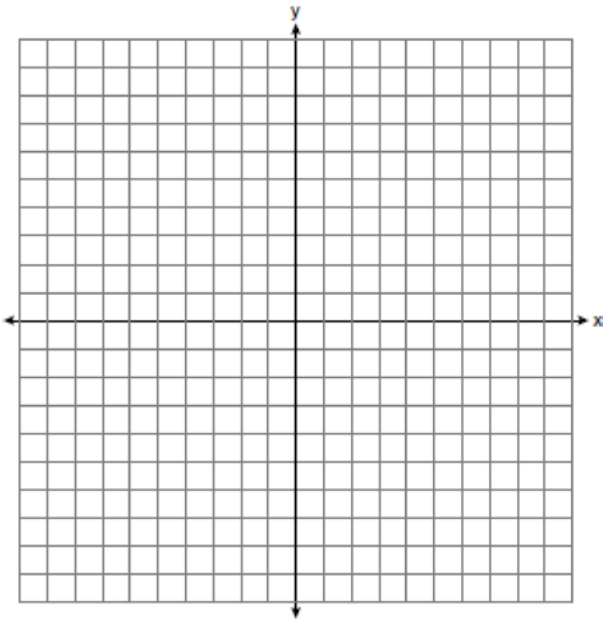
12 Given: $J(-4,1)$, $E(-2,-3)$, $N(2,-1)$
Prove: $\triangle JEN$ is an isosceles right triangle.
[The use of the grid is optional.]



13 A triangle has vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$. Prove that $\triangle ABC$ is an isosceles right triangle. [The use of the set of axes below is optional.]

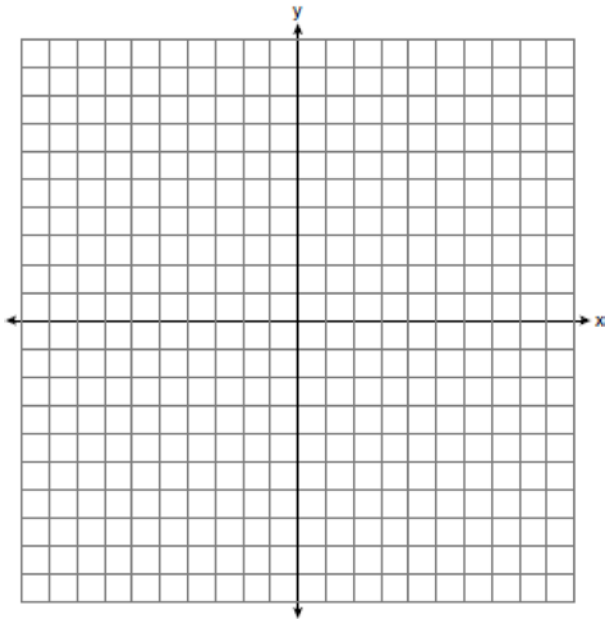


14 Triangle JOE has vertices whose coordinates are $J(4,6)$, $O(-2,4)$, and $E(6,0)$. Prove that $\triangle JOE$ is isosceles. Point $Y(2,2)$ is on $\overline{OE}$. Prove that $\overline{JY}$ is the perpendicular bisector of $\overline{OE}$. [The use of the set of axes below is optional.]

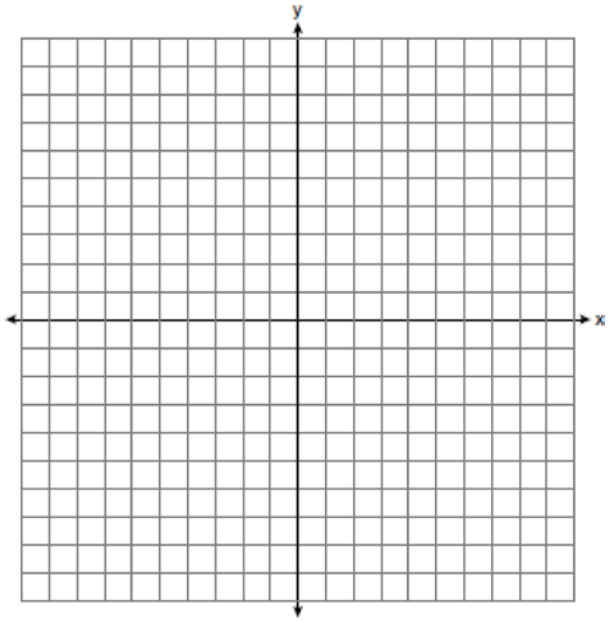


Name: _____

15 Triangle ABC has vertices with coordinates $A(-1,-1)$, $B(4,0)$, and $C(0,4)$. Prove that $\triangle ABC$ is an isosceles triangle but *not* an equilateral triangle. [The use of the set of axes below is optional.]



16 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$. [The use of the set of axes below is optional.]



G.GPE.B.4: Triangles in the Coordinate Plane
Answer Section

1 ANS: 4 REF: 011921geo

2 ANS: 4

The slope of $\overline{BC}$ is $\frac{2}{5}$. Altitude is perpendicular, so its slope is $-\frac{5}{2}$.

REF: 061614geo

3 ANS: 1

$m_{\overline{RT}} = \frac{5--3}{4--2} = \frac{8}{6} = \frac{4}{3}$ $m_{\overline{ST}} = \frac{5-2}{4-8} = \frac{3}{-4} = -\frac{3}{4}$ Slopes are opposite reciprocals, so lines form a right angle.

REF: 011618geo

4 ANS: 2 REF: 061115ge

5 ANS: 2 REF: 081226ge

6 ANS: 3

$AB = 8-4 = 4$. $BC = \sqrt{(-2-(-5))^2 + (8-6)^2} = \sqrt{13}$. $AC = \sqrt{(-2-(-5))^2 + (4-6)^2} = \sqrt{13}$

REF: 011328ge

7 ANS: 1

Since $\overline{AC} \cong \overline{BC}$, $m\angle A = m\angle B$ under the Isosceles Triangle Theorem.

REF: fall0809ge

8 ANS:

No. The midpoint of $\overline{DF}$ is $\left(\frac{1+4}{2}, \frac{-1+2}{2}\right) = (2.5, 0.5)$. A median from point E must pass through the midpoint.

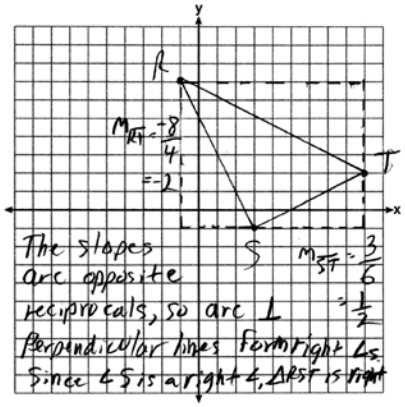
REF: 011930geo

9 ANS:

$\frac{-2--4}{-3-4} = \frac{2}{-7}$; $y-2 = -\frac{2}{7}(x-3)$

REF: 062331geo

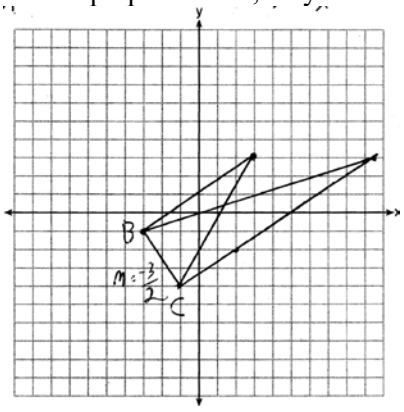
10 ANS:



REF: 011637ge

11 ANS:

The slopes of perpendicular line are opposite reciprocals. Since the lines are perpendicular, they form right angles and a right triangle. $m_{\overline{BC}} = -\frac{3}{2}$ $-1 = \frac{2}{3}(-3) + b$ or $-4 = \frac{2}{3}(-1) + b$



$m_{\perp} = \frac{2}{3}$

$-1 = -2 + b$

$1 = b$

$3 = \frac{2}{3}x + 1$

$2 = \frac{2}{3}x$

$3 = x$

$\frac{-12}{3} = \frac{-2}{3} + b$

$-\frac{10}{3} = b$

$3 = \frac{2}{3}x - \frac{10}{3}$

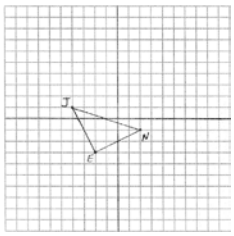
$9 = 2x - 10$

$19 = 2x$

$9.5 = x$

REF: 081533geo

12 ANS:



To prove that $\triangle JEN$ is a right triangle, prove that its legs are perpendicular by showing their slopes are opposite reciprocals: $m_{\overline{JE}} = \frac{1 - -3}{-4 - -2} = \frac{4}{-2} = -2$

$$m_{\overline{EN}} = \frac{-3 - -1}{-2 - 2} = \frac{-2}{-4} = \frac{1}{2}$$

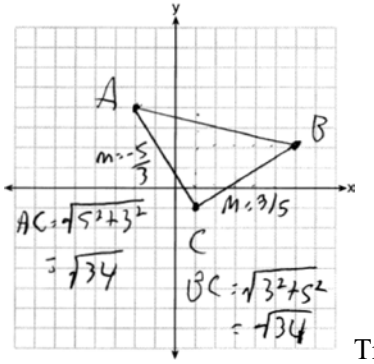
To prove that $\triangle JEN$ is an isosceles triangle, prove that it legs are congruent by using the distance formula:

$d_{\overline{JE}} = \sqrt{(-4-(-2))^2 + (1-(-3))^2} = \sqrt{20}$

$d_{\overline{EN}} = \sqrt{(-2-2)^2 + (-3--1)^2} = \sqrt{20}$

REF: 011029b

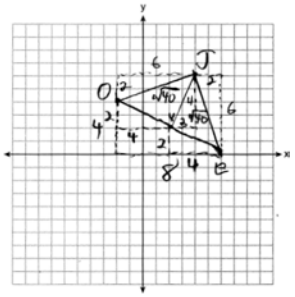
13 ANS:



Triangle with vertices $A(-2,4)$, $B(6,2)$, and $C(1,-1)$ (given); $m_{\overline{AC}} = -\frac{5}{3}$, $m_{\overline{BC}} = \frac{3}{5}$, definition of slope; Because the slopes of the legs of the triangle are opposite reciprocals, the legs are perpendicular (definition of perpendicular); $\angle C$ is a right angle (definition of right angle); $\triangle ABC$ is a right triangle (if a triangle has a right angle, it is a right triangle); $\overline{AC} \cong \overline{BC} = \sqrt{34}$ (distance formula); $\triangle ABC$ is an isosceles triangle (an isosceles triangle has two congruent sides).

REF: 011932geo

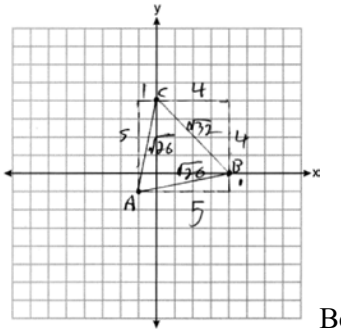
14 ANS:



$JE = JO = \sqrt{6^2 + 2^2} = \sqrt{40}$ Since $\triangle JOE$ has two congruent sides, it is isosceles. $OY = YE = \sqrt{4^2 + 2^2} = \sqrt{20}$ Since $\overline{OY} \cong \overline{YE}$, $\overline{JY}$ is a bisector of $\overline{OE}$. $m_{\overline{OE}} = \frac{4}{-8} = -\frac{1}{2}$ $m_{\overline{JY}} = \frac{4}{2} = 2$ Since the slopes are opposite reciprocals, $\overline{OE} \perp \overline{JY}$.

REF: 062435geo

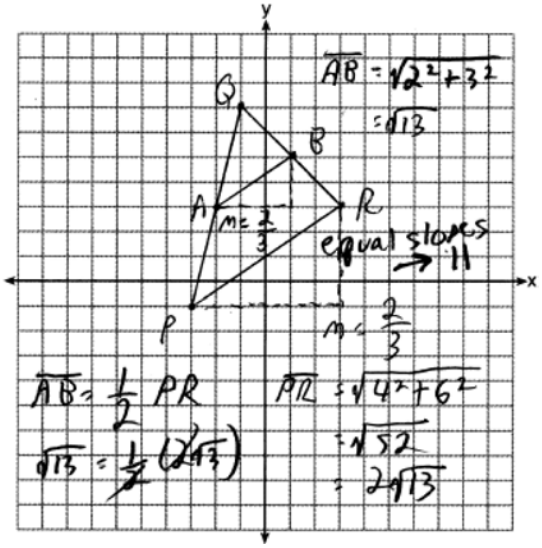
15 ANS:



Because $\overline{AB} \cong \overline{AC}$, $\triangle ABC$ has two congruent sides and is isosceles. Because $\overline{AB} \cong \overline{BC}$ is not true, $\triangle ABC$ has sides that are not congruent and $\triangle ABC$ is not equilateral.

REF: 061832geo

16 ANS:



REF: 081732geo