

(DN) ON BACK OF PACKET

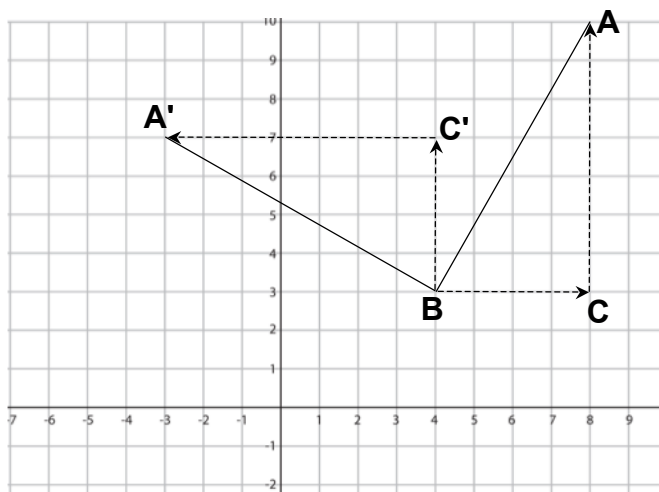
Name \_\_\_\_\_ Per \_\_\_\_\_

LO: I can use the Pythagorean Theorem to prove that the slopes of perpendicular lines are opposite reciprocals.

(1) **Proving that lines with opposite reciprocal slopes are perpendicular by rotation**

calculator

(a) What transformation maps triangle ABC to triangle A'B'C'?



(b) Because of the transformation,  $\overline{A'C'} \perp$  \_\_\_\_\_,  $\overline{B'C'} \perp$  \_\_\_\_\_, and  $\overline{A'B'} \perp$  \_\_\_\_\_

(c) Vector BC is the run (+) of triangle ABC and maps to B'C' which is the \_\_\_\_\_ (+) of triangle A'B'C'.

Vector CA is the rise (+) of triangle ABC and maps to A'C' which is the \_\_\_\_\_ (-) of triangle A'B'C'.

(2) **The converse of the Pythagorean Theorem**

calculator

(a) If a triangle is a right triangle, then the sides are related by the formula \_\_\_\_\_.

Conversely, if the sides of a triangle are related by the formula  $a^2 + b^2 = c^2$ ,

then the triangle is a \_\_\_\_\_

(b) Is a triangle with sides 6, 7, and 9 a right triangle? Provide sufficient evidence to support your claim.

(3)  
calculator

### Proving that lines with opposite reciprocal slopes are perpendicular by Pythagorean Theorem

(a)

Use the grid at the right.

- a. Plot points  $O(0,0)$ ,  $P(3,-1)$ , and  $Q(2,3)$  on the coordinate plane.

- b. Determine whether  $\overline{OP}$  and  $\overline{OQ}$  are perpendicular. Support your findings.

To do part (b), we will determine whether or not  $\overline{OP}$  and  $\overline{OQ}$  are the two shorter sides of the triangle and then determine whether or not triangle  $OPQ$  is a right triangle.



OP

OQ

PQ

(0,0) (3,-1)

(0,0) (2,3)

(3,-1) (2,3)

- (b) Given points  $X(-5, -3)$ ,  $Y(2, -4)$  and  $Z(3,0)$ , are  $XY$  and  $XZ$  perpendicular? Answer using part (a).

(4)  
calculator

**Proving that lines with opposite reciprocal slopes are perpendicular by Pythagorean Theorem**

Prove using the Pythagorean theorem that  $\overline{AC}$  is perpendicular to  $\overline{AB}$  given  $A(-2, -2)$ ,  $B(5, -2)$ , and  $C(-2, 22)$ .

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(5)  
calculator

**Coordinate Grids: What can we prove with distance (length) and slope?**

The points  $O(0,0)$ ,  $A(-4,1)$ ,  $B(-3,5)$ , and  $C(1,4)$  are the vertices of parallelogram  $OABC$ . Is this parallelogram a rectangle? Support your answer.



(8) **Exit Ticket**

calculator

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 (9) **Homework**

calculator

**Provide sufficient evidence for each response.** (1)

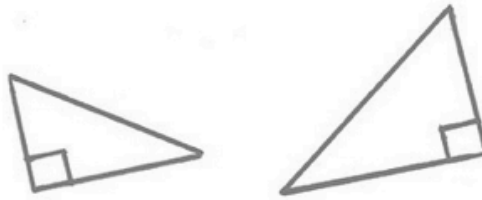
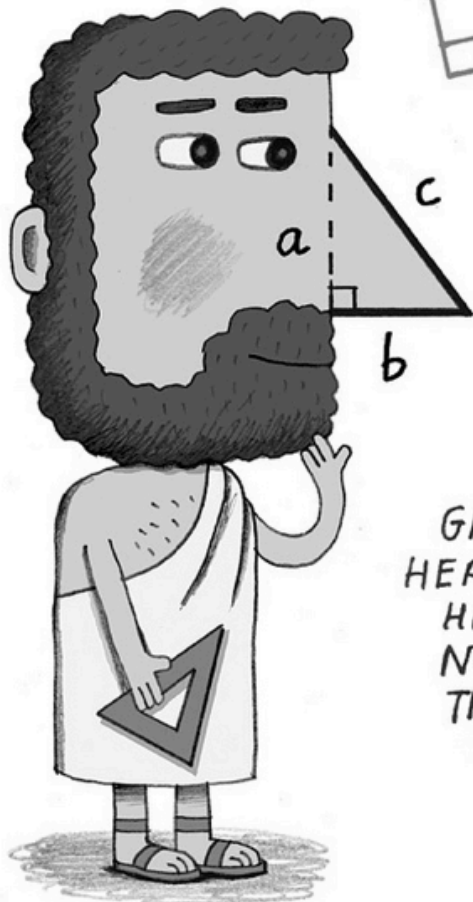
Given points  $O(0, 0)$ ,  $S(2, 7)$ , and  $T(7, -2)$ , where  $\overline{OS}$  is perpendicular to  $\overline{OT}$ , will the images of the segments be perpendicular if the three points  $O$ ,  $S$ , and  $T$  are translated four units to the right and eight units up? Explain your answer.

 (2)

A robot that picks up tennis balls is on a straight path from  $(8, 6)$  towards a ball at  $(-10, -5)$ . The robot picks up a ball at  $(-10, -5)$ , then turns  $90^\circ$  right. What are the coordinates of a point that the robot can move towards to pick up the last ball?

 (3)

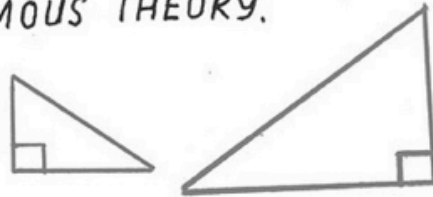
Gerry thinks that the points  $(4, 2)$  and  $(-1, 4)$  form a line perpendicular to a line with slope 4. Do you agree? Why or why not?



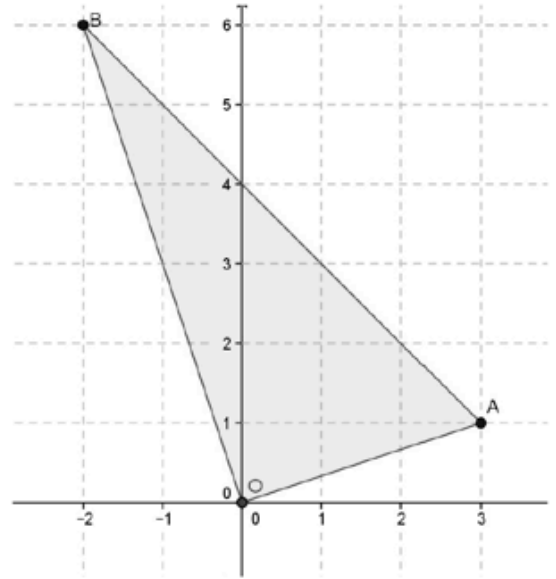
## PYTHAGORAS' THEOREM

$$a^2 + b^2 = c^2$$

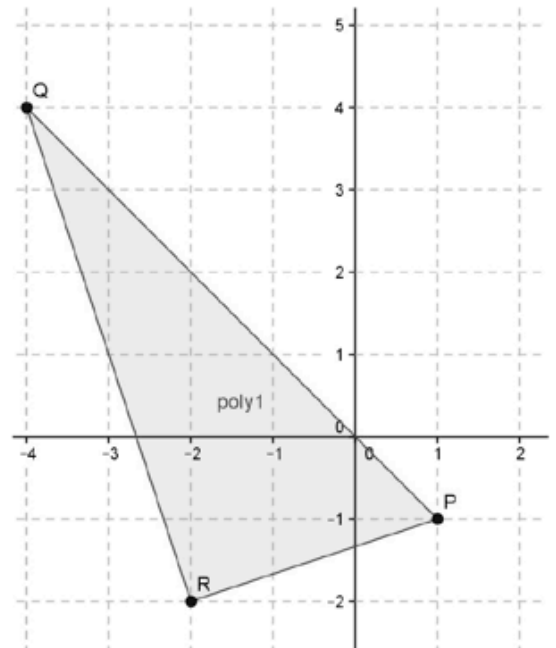
GREEK MATHEMATICAL  
HEAVYWEIGHT PYTHAGORAS  
HAD A VERY PROMINENT  
NOSE WHICH GAVE HIM  
THE IDEA FOR HIS  
FAMOUS THEORY.



1. Given points  $O(0, 0)$ ,  $A(3, 1)$ , and  $B(-2, 6)$ , prove  $\overline{OA}$  is perpendicular to  $\overline{OB}$ .



2. Given points  $P(1, -1)$ ,  $Q(-4, 4)$ , and  $R(-2, -2)$ , prove  $\overline{PR}$  is perpendicular to  $\overline{QR}$  without the Pythagorean theorem.



**DO NOW**    Name \_\_\_\_\_ Date \_\_\_\_\_ Per \_\_\_\_\_

**8.4**

A triangle has side lengths 10, 6, and 8. Is the triangle a right triangle? What might you do to check to see if it is a right triangle?



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