Integrated Math 3
Unit 1: Analytic Geometry
1.8 Review Worksheet

Name: ______________________

Date: ____________ Period: ________

Unit 1 Quiz Review

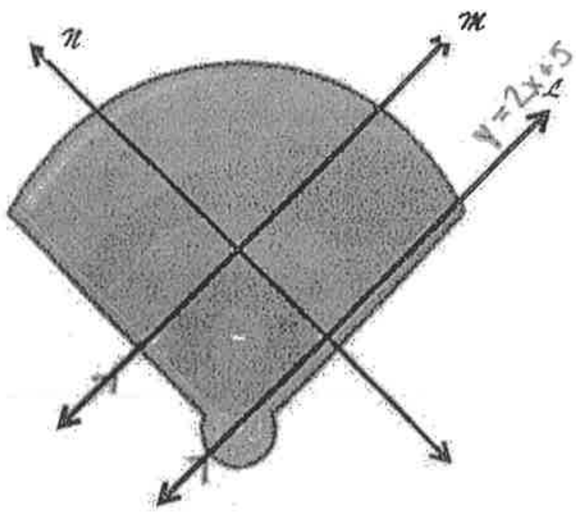
Formulas: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Area of a Triangle: $A = \frac{1}{2} \cdot b \cdot h$ *Area of a Rectangle/Square:* $A = b \cdot h$

Area of a Parallelogram: $A = b \cdot h$ *Area of a Rhombus:* $A = b \cdot h$ or $A = \frac{1}{2} \cdot d_1 \cdot d_2$

Area of a Kite: $A = \frac{1}{2} \cdot d_1 \cdot d_2$ *Area of a Trapezoid:* $A = \frac{1}{2} \cdot h(b_1 + b_2)$

1. A baseball field is made up of many parallel and perpendicular lines. If the equation of first base line (line ℓ) is represented by $y = 2x + 5$,



$y = mx + b$

a) find the equation of the line, in slope intercept form, formed between 2^{nd} and 3^{rd} base (line m) if 3^{rd} base is represented by the point $(2, 8)$.

Line L and M are parallel so they share the same slope → $m = 2$

$y - 8 = 2(x - 2)$ ← Point-slope form

$y - 8 = 2x - 4$

$+8 \quad +8$

$\boxed{y = 2x + 4}$ ← Slope-intercept form

b) find the equation of the line, in slope intercept form, formed between 1^{st} and 2^{nd} base (line n) if 2^{nd} base is represented by the point $(6, 12)$.

Line L and N are perpendicular so their slopes are opposite reciprocals → $m = -\frac{1}{2}$

$y - 12 = -\frac{1}{2}(x - 6)$ ← Point-slope form

$y - 12 = -\frac{1}{2}x + 3$

$+12 \quad +12$

$\boxed{y = -\frac{1}{2}x + 15}$ ← Slope-intercept form

c) find the distance between second base and third base.

$(6, 12) \quad (2, 8)$

$d = \sqrt{(6-2)^2 + (12-8)^2} = \sqrt{32} = \sqrt{16 \cdot 2} = \boxed{4\sqrt{2} \text{ units}}$

2. For the questions below, write equations that match the given criteria.

a) Write an equation of a line in slope-intercept form that is parallel to $y = 3x - 5$ and has a y-intercept of $(0, 4)$.

$y = mx + b$

same slope!

$m = 3$

$b = 4$

$\boxed{y = 3x + 4}$

b) Write an equation of a line in slope-intercept form that is perpendicular to $y = -\frac{2}{5}x - 1$ and crosses through the point $(4, -6)$.

slopes are opposite reciprocals

$m = \frac{5}{2}$

Point-Slope: $y + 6 = \frac{5}{2}(x - 4)$

$y + 6 = \frac{5}{2}x - 10$

$-6 \qquad -6$

Slope-intercept: $\boxed{y = \frac{5}{2}x - 16}$

c) Write an equation of a line in slope-intercept form that is parallel to $y = \frac{3}{4}x + 2$ and goes through the point $(5, -1)$.

$m = \frac{3}{4}$

Point-slope: $y + 1 = \frac{3}{4}(x - 5)$

$y + 1 = \frac{3}{4}x - \frac{15}{4}$

$-1 \qquad -1$

$\boxed{y = \frac{3}{4}x - \frac{19}{4}}$

3. Two points that lie at $(7, 8)$ and $(x, -4)$ have a distance 20 units apart from each other. Find all possible values of x. Show evidence to support your work.

$\sqrt{(x-7)^2 + (-4-8)^2}^{\,2} = 20^2$

$(x-7)^2 + (-4-8)^2 = 400$

$(x-7)^2 + 144 = 400$

$-144 \qquad -144$

$\sqrt{(x-7)^2} = \sqrt{256}$

$x - 7 = \pm 16$

$+7 \qquad +7$

$x = \pm 16 + 7$

$16 + 7 = \boxed{23}$

$-16 + 7 = \boxed{-9}$

$\boxed{x = -9, 23}$

4. Convert the following equations from point-slope form to slope-intercept form. → Solve for y!

a) $y + 7 = 3(x + 5)$

$y + 7 = 3x + 15$

$-7 \qquad -7$

$\boxed{y = 3x + 8}$

b) $y + 3 = -\frac{3}{4}(x - 4)$

$y + 3 = -\frac{3}{4}x + 3$

$-3 \qquad -3$

$\boxed{y = -\frac{3}{4}x}$

5. Compare and contrast (be specific)...

a) a rectangle and a parallelogram.

Both have two sets of opposite parallel sides. Both have congruent opposite sides as well. Rectangles always have four right angles, which isn't necessarily true for parallelograms.

b) a kite and a square.

• Both have two sets of congruent sides. On a kite, the adjacent sides are congruent, but not all four sides are congruent to each other. On a square, all four sides must be congruent.
• A square must have parallel opposite sides and perpendicular adjacent sides. A kite has no requirements regarding parallel & perpendicular sides.

c) an isosceles triangle and scalene triangle.

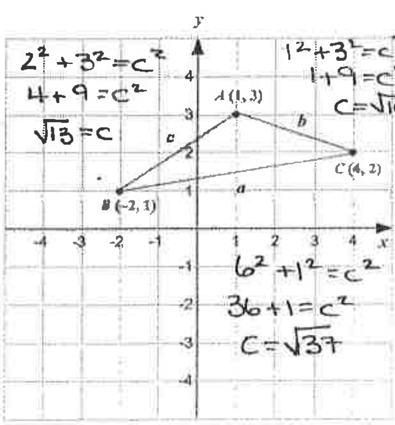
Both are three-sided polygons. All three sides cannot be congruent for both types of triangles. An isosceles triangle has two congruent sides, whereas a scalene triangle has no sides that are congruent.

d) a trapezoid and a parallelogram.

• Both have parallel opposite sides. A trapezoid only has one set of opposite parallel sides, whereas a parallelogram has two sets of opposite parallel sides.
• A parallelogram must have congruent opposite sides. A trapezoid has no requirements regarding side lengths.

6. Find the perimeter of each of the following and then classify the polygon.

a.)



$2^2+3^2=c^2$
$4+9=c^2$
$\sqrt{13}=c$

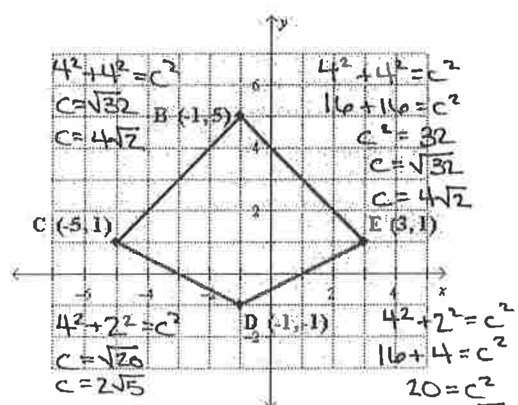
$1^2+3^2=c^2$
$1+9=c^2$
$c=\sqrt{10}$

$6^2+1^2=c^2$
$36+1=c^2$
$c=\sqrt{37}$

Scalene Triangle

Perimeter $= \boxed{\sqrt{13}+\sqrt{10}+\sqrt{37} \text{ units}}$

b.)



$4^2+4^2=c^2$
$c=\sqrt{32}$
$c=4\sqrt{2}$

$4^2+4^2=c^2$
$16+16=c^2$
$c^2=32$
$c=\sqrt{32}$
$c=4\sqrt{2}$

$4^2+2^2=c^2$
$c=\sqrt{20}$
$c=2\sqrt{5}$

$4^2+2^2=c^2$
$16+4=c^2$
$20=c^2$
$c=\sqrt{20}$
$c=2\sqrt{5}$

Kite

Perimeter $= 4\sqrt{2}+4\sqrt{2}+2\sqrt{5}+2\sqrt{5}$
$= \boxed{8\sqrt{2}+4\sqrt{5} \text{ units}}$

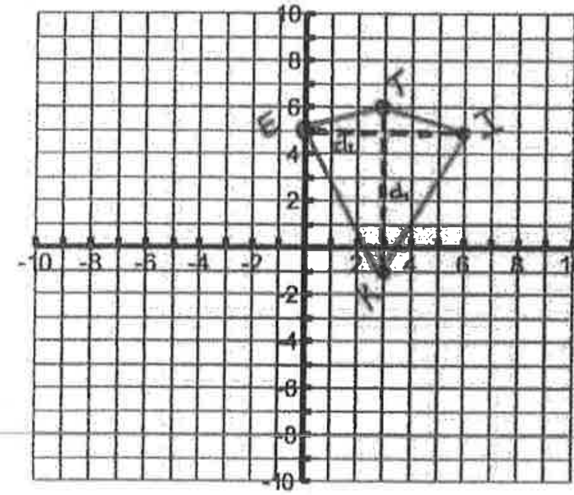
7. a) Determine the most descriptive name for quadrilateral $ETIK$ with vertices at each set of coordinates below. Sketch a graph if it's helpful, but include mathematical evidence (slope, distance, etc.) to validate claims. (2+ sentences.)

$E(0,5)$

$T(3,6)$

$I(6,5)$

$K(3,-1)$



$\overline{ET} = \sqrt{10}$ $\quad m = \frac{1}{3}$

$\overline{TI} = \sqrt{10}$ $\quad m = -\frac{1}{3}$

$\overline{IK} = \sqrt{45} = 3\sqrt{5}$ $\quad m = 2$

$\overline{EK} = \sqrt{45} = 3\sqrt{5}$ $\quad m = -2$

This is a Kite. $\overline{ET}$ and $\overline{TI}$ are two adjacent sides and both of them have a length of $\sqrt{10}$ units making them congruent. Also, $\overline{IK}$ and $\overline{EK}$ are adjacent sides, each with a length of $3\sqrt{5}$ so they are congruent. A kite must have two sets of congruent, adjacent sides which are present in this shape.

b) Now, calculate the area and perimeter.

Perimeter =

$\sqrt{10} + \sqrt{10} + 3\sqrt{5} + 3\sqrt{5}$

$= \boxed{2\sqrt{10} + 6\sqrt{5} \text{ units}}$

Area = $\frac{1}{2} \cdot d_1 \cdot d_2$

$= \frac{1}{2} \cdot 7 \cdot 6$

$= \boxed{21 \text{ units}^2}$