Unit 1 Study Guide

Name _____ AK _____ S ___

Use points $P(2, -1)$ & $Q(-9, -6)$ for #1 & 2.

1) What coordinate point partitions the directed line segment $\overline{PQ}$ by a ratio $\frac{3}{2}$? $\frac{3}{5}$

$$x = 2 + \frac{3}{5}(-11) = \frac{2}{1} - \frac{33}{5} = \frac{10}{5} - \frac{33}{5} = \boxed{-\frac{23}{5}}$$

$$y = -1 + \frac{3}{5}(-5) = \frac{-1}{1} - \frac{15}{5} = \frac{-5}{5} - \frac{15}{5} = \frac{-20}{5} = \boxed{-4}$$

$$\boxed{\left(-\frac{23}{5}, -4\right)}$$

2) What coordinate point partitions the directed line segment $\overline{QP}$ by a ratio $\frac{2}{3}$?

$$x = -9 + \frac{2}{5}(11) = \frac{-9}{1} + \frac{22}{5} = \frac{-45 + 22}{5}$$

$$y = -6 + \frac{2}{5}(5) = \frac{-6}{1} + \frac{12}{5} = \frac{-30 + 10}{5}$$

$$\boxed{\left(\frac{-23}{5}, -4\right)}$$

3) An equation of a line **a** is $y = -\frac{1}{2}x - 2$. See graph.

$$m = -\frac{1}{2} \to \frac{2}{1}$$

What is the equation of the line that is perpendicular to line **a** shown on the graph and passes through point $(-4, 0)$.

$$0 = -4(2/1) + b$$
$$0 = -8 + b$$
$$b = 8$$

$$\boxed{y = \frac{2}{1}x + 8}$$

Parallelogram ABCD at right has vertices as shown.

4) What is the perimeter of ABCD?

Length of $\overline{AB} = \overline{DC}$

$$d_{AB} = \sqrt{(4)^2 + (-2)^2} = \sqrt{20} = 2\sqrt{5}$$

$$6 + 6 + 2\sqrt{5} + 2\sqrt{5} = \boxed{12 + 4\sqrt{5} \text{ or } 20.94 \text{ units}}$$

5) What is the length of each diagonal?

$$d \ \overline{AC} = \sqrt{(3 - (-1))^2 + (-4 - 4)^2} = \sqrt{4^2 + (8)^2} = \sqrt{16 + 64} = \sqrt{80}$$
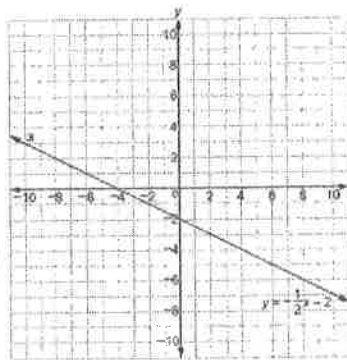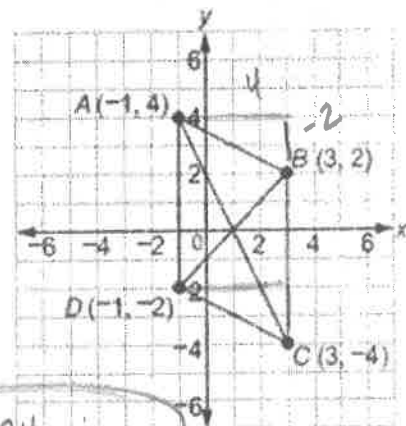$$= \boxed{4\sqrt{5} \text{ or } 8.94 \text{ units}}$$

$$d_{DB} = \sqrt{(3 - (-1))^2 + (2 - (-2))^2} = \sqrt{(4)^2 + (4)^2} = \sqrt{16 + 16} = \sqrt{32}$$
$$\boxed{4\sqrt{2} \text{ or } 5.66 \text{ units}}$$

6) What is the area of the parallelogram? Area = bh

$$A = 6 \cdot 4 = \boxed{24 \text{ units}^2}$$

Write the equation of the lines below in slope-intercept form: y = mx + b.

7) Through $(-4, 5)$ and parallel to $y = -\frac{3}{2}x - 5$.

$5 = -\frac{3}{2}\left(\frac{-4}{1}\right) + b$

$5 = \frac{12}{2} + b$

$5 = 6 + b$

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

$b = 5 - 6 \quad b = -1$

8) Through $(4, 1)$ and perpendicular to $y = \bigcirc{-2x} - 2$

$1 = \frac{1}{2}\left(\frac{4}{1}\right) + b$

$1 = \frac{4}{2} + b$

$1 = 2 + b$

$\boxed{y = \frac{1}{2}x - 1}$

$b = 1 - 2 \quad b = -1$

Find the area and perimeter of the following triangle. Simplest form required. Reminder: Draw altitude to find height.

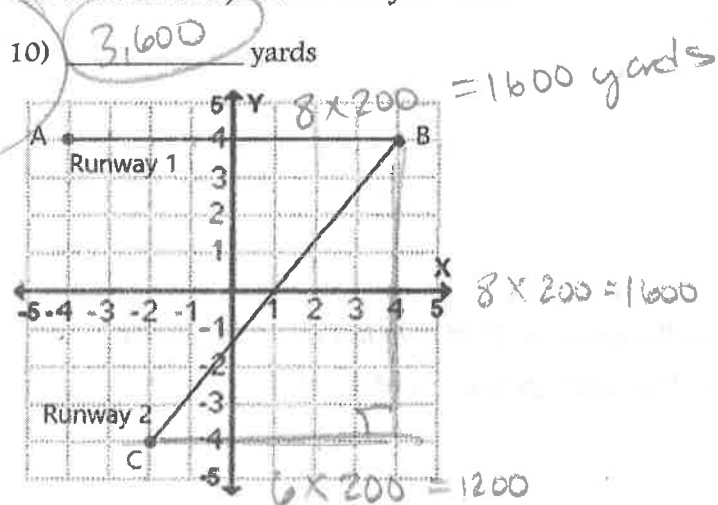9 Area = $\boxed{58.5 \, u^2}$ Perimeter = $\boxed{9 + \sqrt{194} + \sqrt{365}}$
or
42.03 units
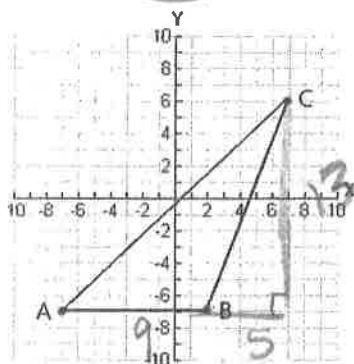
$A = \frac{9 \cdot 13}{2} = \frac{117}{2} = 58.5 u^2$

$d_{AC} = \sqrt{(14)^2 + (13)^2} = \sqrt{365}$

$d_{BC} = \sqrt{(5)^2 + (13)^2} = \sqrt{194}$

In the diagram, two runways intersect at point B. Each square is 200 x 200 yards square. If you walked from A to B and then to C, how far did you walk?

10) $\boxed{3,600}$ yards

$8 \times 200 = 1600 \text{ yards}$

$8 \times 200 = 1600$

$6 \times 200 = 1200$

$d_{BC} = \sqrt{(1200)^2 + (1600)^2}$

$= 2000$

$1600 + 2000 = 3,600 \text{ yards}$