

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

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

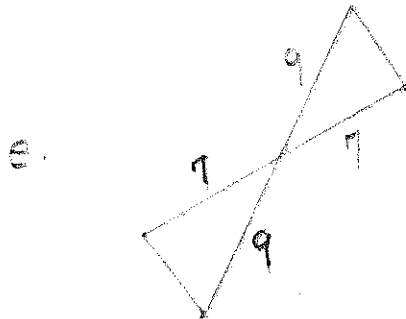
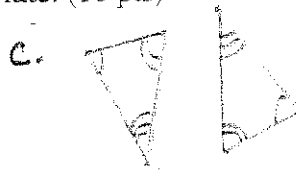
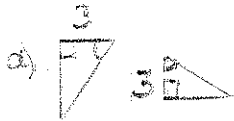
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$$

$$r^2 = (x - a)^2 + (y - b)^2$$

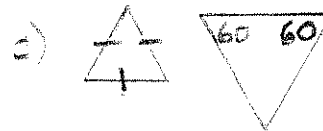
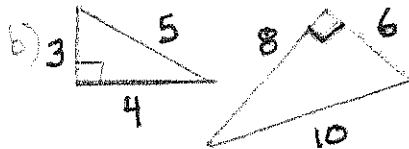
$$y = mx + b$$

$$y - y_1 = m(x - x_1)$$

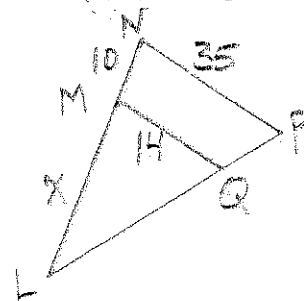
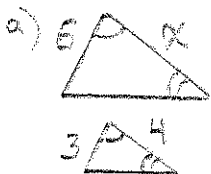
1. For each of the following pairs of triangles, determine whether they are congruent. Justify your answer by writing the congruence property if appropriate. (10 pts)



2. For the given pair of triangles, determine whether or not they are similar. Justify your answer by indicating congruent or proportional parts and a similarity property. (6 pts)



3. The triangles below are similar. Find the missing sides that are labeled. (2, 3, 3 = 8 pts)



4. Find the equation of the line that: (2, 2, 2, 2, 2 = 11 pts) Write answers in slope-intercept form.

a. passes through the point (9, 12) and has a slope of $\frac{2}{3}$. _____

b. has a y-intercept of -2
and a slope of 3

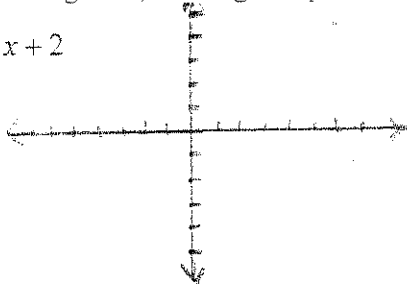
c. is vertical and passes
through the point (2, 10)

c. passes through the points (4, 7) and (5, 11). _____

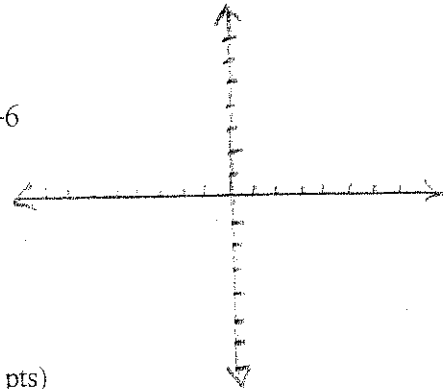
d. passes through (2, -3) and is perpendicular to the line $6x + 2y = 8$. _____

5. Graph the following lines, labeling two points on each line. (4 pts)

a. $y = \frac{-2}{3}x + 2$



b. $2y - 4x = -6$



6. Find the following. Answers without work will receive no credit. (12 pts)

a. Find the equation of the circle with center (-2, 5) and radius of length 6. (worth 3, 6, 3)

a. Find the midpoint, distance, and slope of the line segment with endpoints (-2, 12) and (-10, 6).

Midpoint: _____

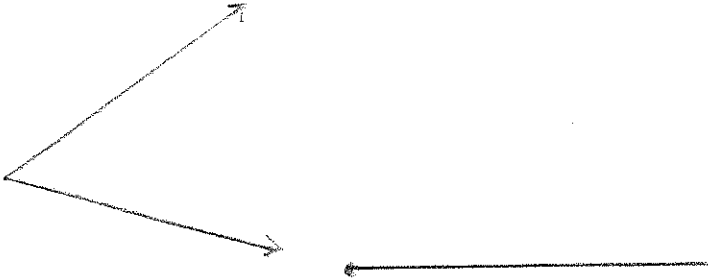
Distance: _____

Slope: _____

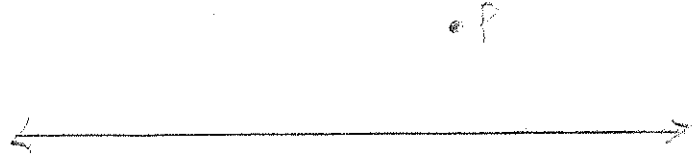
6. Find the equation of the circle that has endpoints on its diameter at $(-2,12)$ and $(-10,6)$ (note these are the same coordinate as in part b).

7. Do the following constructions using compass and straight-edge only. Do NOT erase any construction lines. (16 pts)

a. Copy the angle.



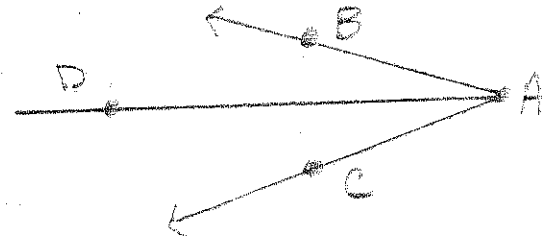
B. Construct the perpendicular to l through point P.



c. Construct an equilateral triangle.

D. Construct a 120 degree angle.

8. The construction process of bisecting an angle has been performed for you below. Use the figure below to write out the justification of why this construction must give two congruent angles. (5 pts)
Draw in line segments as needed.

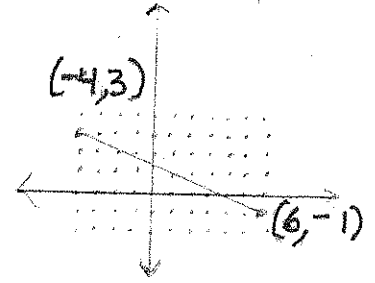


9. At a certain time of day, a television relay tower casts a shadow (on the ground) 100 meters long, and a nearby pole 12 meters tall casts a shadow 15 meters long. (7 pts)

- Draw triangles to represent this situation. Label the vertices.
- Justify the statement that the triangles drawn in part a are similar.
- How tall is the tower?

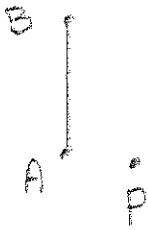
10. Karl was looking for the midpoint of the line segment with endpoints $(-4, 3)$ and $(6, -1)$. Karl did the following, is he correct? Why or why not? (5 pts)

$$\begin{array}{l|l} 6 - (-4) = 10 & 3 - (-1) = 4 \\ \hline \frac{10}{2} = 5 & \frac{4}{2} = 2 \\ 5 + (-4) = 1 & 2 + (-1) = 1 \\ \hline (1, 1) = \text{midpoint} \end{array}$$

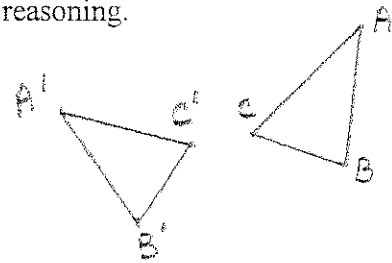


11. Do the following transformations. Use your compass and straight edge if possible. (6 pts)

- a. Rotate \overline{AB} about point P +90 degrees (i.e. counter clockwise). Explain why this is correct.



- b. $\triangle ABC$ has been reflected about a line of reflection to its image $\triangle A'B'C'$. Find the line of reflection and explain your reasoning.



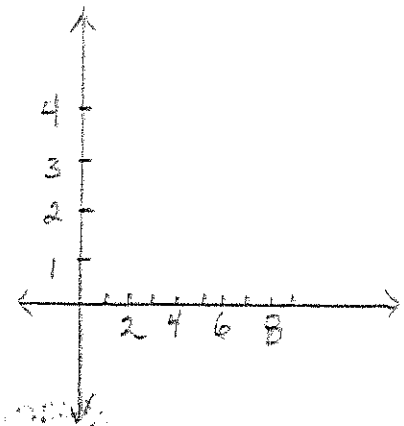
12. Lindsey is considering hiring a band for her wedding reception. Two bands are available. The Smashers charge \$200 up front and \$50 per hour. The Rockers charge \$300 up front and \$30 per hour. (5 pts)

- Write the linear cost equations for the Rockers band and for the Smashers band.
- Find the coordinate point where these two lines intersect.
- What is the significance of the point where the two lines intersect?

13. Prove or Disprove the following about quadrilateral ABCD using the tools you have learned in class.

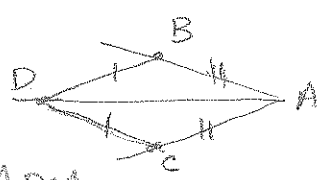
A $(0, 0)$ B $(1, 3)$ C $(5, 3)$ D $(6, 0)$ (6 pts)

- Quadrilateral ABCD is a trapezoid.
- The diagonals bisect each other.



Exam 3 M123 S'08 Answers

1. a) ASA b) \neq c) \neq d) SAS \cong e) SAS vertical \angle 's

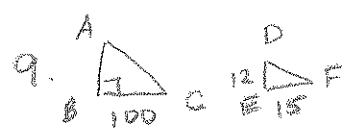


2. a) SAS b) SSS or SAS c) AA

8. $\triangle DBA \cong \triangle DCA$
by SSS
so $\angle BAD \cong \angle DAC$

3. $\frac{6}{3} = \frac{x}{4}$ b) $\frac{10}{15} = \frac{x}{6}$ c) $\frac{x+10}{x} = \frac{35}{14}$
 $x=8$ $x=4$

$14x + 140 = 35x$
 $x = \frac{20}{3} = 6 \frac{2}{3}$



b) $\angle A \cong \angle D$ by the same angle
 $\angle B \cong \angle E$ so by AA
 $\triangle ABC \cong \triangle DEF$

4. a) $y - 12 = \frac{2}{3}(x - 9)$
 $y = \frac{2}{3}x + 6$

b) $y = 3x - 2$

c) $x = 2$

c) $m = \frac{11-7}{5-4} = 4$

$y - 7 = 4(x - 4)$
 $y = 4x - 9$

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

10. Yes, he is correct. He found the length of the horizontal + vertical line segments, then halved those. Then he added that amount to the x starting point + y starting point which gives the midpoint.



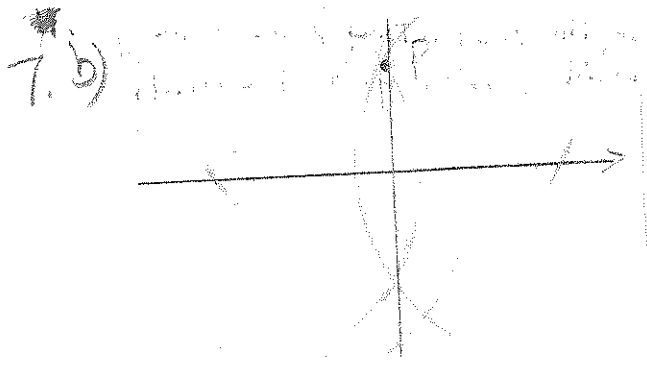
6. a) $(x+2)^2 + (y-5)^2 = 36$

b) Midpt $(-6, 9)$

Dist 10

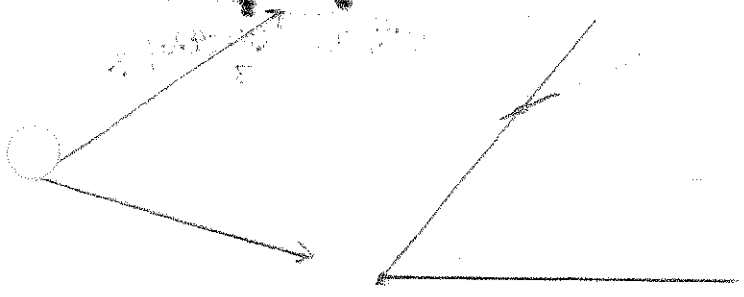
slope $3/4$

c) $(x+6)^2 + (y-9)^2 = 25$

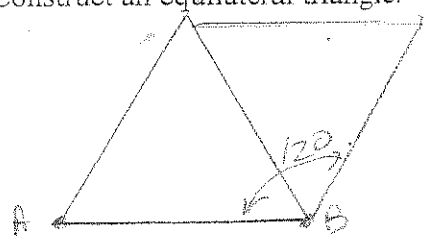


7. a)

a. Copy the angle.



7. c. Construct an equilateral triangle.



measure AB with compass

10. Karl was looking for the midpoint of the line segment with endpoints $(-4, 3)$ and $(6, -1)$. Karl did the following, is he correct? Why or why not? (5 pts)

Yes. He is correct.

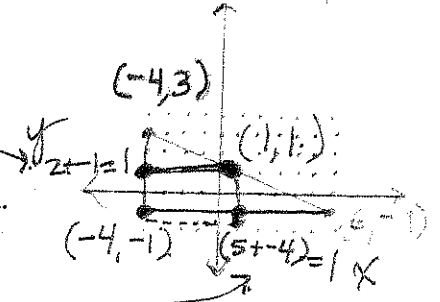
He found the length of the horizontal + vertical line segments, then halved those. Then he added that amount to the x starting point + the y starting point which gives the midpoint.

$$6 - (-4) = 10 \quad 3 - (-1) = 4$$

$$\frac{10}{2} = 5 \quad \frac{4}{2} = 2$$

$$5 + (-4) = 1 \quad 2 + (-1) = 1$$

$(1, 1) = \text{midpoint}$



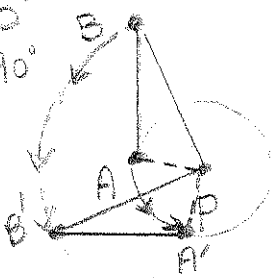
11. Do the following transformations. Use your compass and straight edge if possible. (6 pts)

a. Rotate \overline{AB} about point P +90 degrees (i.e. counter clockwise).

Explain why this is correct.

$$m\angle B'PB' = 90^\circ$$

$$m\angle A'PA' = 90^\circ$$

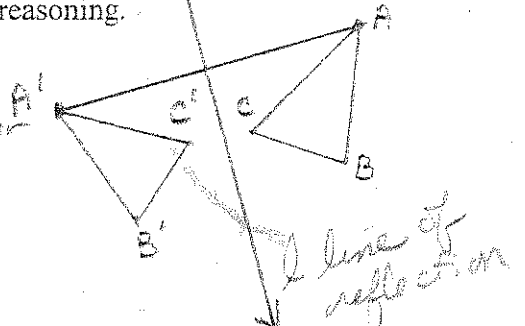


B moved around on its circle with center P, 90 degrees. And A moved around on its smaller circle with center P +90 degrees.

b. $\triangle ABC$ has been reflected about a line of reflection to its image $\triangle A'B'C'$.

Find the line of reflection and explain your reasoning.

Find the perpendicular bisector of $A'A$



12. Lindsey is considering hiring a band for her wedding reception. Two bands are available. The Smashers charge \$200 up front and \$50 per hour. The Rockers charge \$300 up front and \$30 per hour. (5 pts)

- Write the linear cost equations for the Rockers band and for the Smashers band.
- Find the coordinate point where these two lines intersect.
- What is the significance of the point where the two lines intersect?

a) $C = 200 + 50h$
 $C = 300 + 30h$

b) $200 + 50h = 300 + 30h$
 $20h = 100$
 $h = \frac{100}{20} = 5 \text{ hours}$

c) Same amt of cost at 5 hours

13. Prove or Disprove the following about quadrilateral ABCD using the tools you have learned in class. (6 pts)

A $(0, 0)$ B $(1, 3)$ C $(5, 3)$ D $(6, 0)$

- Quadrilateral ABCD is a trapezoid.
- The diagonals bisect each other.

a) $\overline{BC} \parallel \overline{AD}$ $m_{BC} = \frac{3-3}{5-1} = 0$
 $m_{AD} = \frac{0-0}{6-0} = 0$ } same slope so ll.

b) $M_{BD} = \left(\frac{1+6}{2}, \frac{3+0}{2} \right) = \left(\frac{7}{2}, \frac{3}{2} \right)$
 $M_{CA} = \left(\frac{0+5}{2}, \frac{0+3}{2} \right) = \left(\frac{5}{2}, \frac{3}{2} \right)$ } no they don't bisect each other

