Your Geometry Final Exam will take place on Friday, May 27th, 2016.
Below is the list of review problems that will be due in order to prepare you:

<table>
<thead>
<tr>
<th>Assignment #</th>
<th>Due Date</th>
<th>Homework</th>
<th>In-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monday, May 23rd</td>
<td>#1, 2, 4, 6, 8, 9, 10, 11, 12, 14</td>
<td>#3, 5, 7, 13</td>
</tr>
<tr>
<td>2</td>
<td>Tuesday, May 24th</td>
<td>#16, 18, 21, 22, 23, 25, 27, 29, 30, 32</td>
<td>#15, 17, 19, 20, 24, 26, 28, 31</td>
</tr>
<tr>
<td>3</td>
<td>Wednesday, May 25th</td>
<td>#34, 35, 36, 37, 41, 42, 43, 44, 45, 46, 47</td>
<td>#33, 38, 39, 40, 49, 51, 53, 54, 55, 56</td>
</tr>
<tr>
<td>4</td>
<td>Thursday, May 26th</td>
<td>#48, 50, 52, 57, 58, 59, 60, 61, 62, 63, 64, 70</td>
<td>#65, 66, 67, 68, 69</td>
</tr>
</tbody>
</table>

Your name: Answer Key
GEOMETRY SEMESTER 2 FINAL EXAM FORMULA SHEET

This is an identical copy of the formula sheet you will receive on your final exam. You will be able to use this as you study and complete the review packet to familiarize yourself with what the formula page will look like, but you will be given a new formula sheet on the final so this one is just for studying.

Volume and Surface Area

Volume of Prisms/Cylinders = (Area of base)(Height of Prism)

Volume of Pyramid/Cone = \( \frac{(Area \ of \ base)(Height)}{3} \)

Surface Area: Add up the area of all the surfaces

Surface Area of a cone: \( \pi r^2 + \pi rl \) *where \( l \) is slant height!

Trigonometry of Right Triangles

\[ \sin M = \frac{\text{opposite leg}}{\text{hypotenuse}} \]
\[ \cos M = \frac{\text{adjacent leg}}{\text{hypotenuse}} \]
\[ \tan M = \frac{\text{opposite leg}}{\text{adjacent leg}} \]

*remember \( S \frac{O}{H} \ C \frac{A}{H} \ T \frac{O}{A} \)

where "M" is an angle!

Coordinate Geometry Formulas

\[ \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \]
Distance Formula

\[ \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \]
Midpoint Formula

\[ \frac{y_2 - y_1}{x_2 - x_1} = m \]
(finding slope between two points)

\[ y - y_1 = m(x - x_1) \]
Point-Slope Form

\[ y = mx + b \]
Slope-Intercept Form
Ch 7: Surface Area and Volume

1) A box of tissues measures 5 inches wide, 6 inches high, and 8 inches long.

What is the surface area and volume of the tissue box?

\[
\text{SA} = 2(8.6) + 2(5.6) + 2(8.5) \\
= 2(48) + 2(30) + 2(40) \\
V = 8(5)(6)
\]

Surface Area = 236 \text{ in}^2

Volume = 240 \text{ in}^3

2) A cylinder has a height of 6 cm and a base diameter of 10 cm.

a) Find the lateral surface area

\[
Lateral \ SA = 2 \pi rh = 2 \pi (5)(6)
\]

b) Find the total surface area

\[
\text{Total } SA = 2 \pi rh + \pi r^2 \\
= 2 \pi (5)(6) + \pi (5)^2 \\
= 60 \pi + 50 \pi \\
SA = 110 \pi \text{ cm}^2
\]

c) Find the volume

\[
V = \pi r^2 h \\
V = \pi (5)^2 (6) = 150 \pi \text{ cm}^3
\]

3) A pyramid has a square base. Each edge of the base is 4 in, and its slant height is 6 in.

Find its total surface area.

\[
4 \left( \frac{4 \cdot 6}{3} \right) + 4^2 = SA \\
48 + 16 = SA \\
64 \text{ in}^2 = SA
\]
4) Using the following cone, find:

a) its lateral surface area
   \[ \text{Lateral SA} = \pi rl \]
   \[ \pi rl = \pi \cdot 6 \cdot 10 = 600 \pi \text{cm}^2 \]

b) its total surface area
   \[ \text{Total SA} = \pi rl + \pi r^2 \]
   \[ = \pi (6)(10) + \pi (6)^2 \]
   \[ = 60\pi + 36\pi = 96\pi \text{cm}^2 \]

c) its volume
   \[ V = \frac{1}{3} \cdot \pi r^2 \cdot h \]
   To find \( h \):
   \[ 6^2 + h^2 = 10^2 \]
   \[ h \approx 8 \]

   \[ V = \frac{1}{3} \cdot \pi (6)^2 (8) \]
   \[ V = 96\pi \text{cm}^3 \]

5) This pyramid has a square base with each edge = 12 cm. The height is 8 cm.

Find the total surface area of the pyramid.

To find slant height:
\[ 6^2 + 8^2 = l^2 \]
\[ 36 + 64 = l^2 \]
\[ \sqrt{100} = l \]
\[ l = 10 \]

Total SA = \[ 4 \left( \frac{12 \cdot 10}{2} \right) + 12^2 \]
\[ = 240 + 144 \]
\[ \text{SA} = 584 \text{cm}^2 \]

6) Pictured at right is a right triangular prism. The height of the prism is 26 cm.
The triangular bases have a base and height of 5 cm and 12 cm. Find the total surface area of the prism.

To find \( x \): 
\[ 5^2 + 12^2 = x^2 \]
\[ 25 + 144 = x^2 \]
\[ 169 = x^2 \]
\[ \sqrt{169} = \sqrt{x^2} \Rightarrow x = 13 \]

\[ \text{SA} = 2 \left( \frac{5 \cdot 12}{2} \right) + 5 \cdot 26 + 12 \cdot 26 + 13 \cdot 26 \]
\[ \text{SA} = 840\text{cm}^2 \]
7) A cone has a volume of $7,525\pi$ m$^3$. If the cone has a height of 25 meters, find the:

a) Lateral surface area

\[
V = \frac{1}{3} \pi r^2 h
\]

\[
3(7525\pi) = \left(\frac{1}{3} \pi r^2 \cdot 25\right)^3
\]

Solve for $r$: \[r = 25\sqrt{\frac{3}{\pi}}\]

\[
l = \sqrt{25^2 + \left(\frac{3}{\pi}\right)^2} = 25^2 + 903 = 625 + 903 = 1528
\]

b) Total surface area

\[
V = \frac{1}{3} \pi r^2 h
\]

\[
2525 \pi = \pi r^2 \cdot 25
\]

\[
903 = r^2
\]

\[
r = \sqrt{903}
\]

8) Find the volume AND total surface area of the figure below.

Assuming base is a regular pentagon with apothem 8.9

Area of Pentagonal base

\[
A = \frac{1}{2} \cdot P \cdot a = \frac{1}{2} (13.5) (8.9) = 289.25
\]

\[
V = 289.25 (8) = 2314 \text{ un}^3
\]

\[
SA = (289.25)^2 + 5(13.8) = 1098.5 \text{ un}^2
\]

Ch 8: Circles & Arcs

9) What is the relationship between the measure of a central angle and the measure of its intercepted arc?

\[
\text{measure of central angle} = \text{measure of its intercepted arc}
\]

10) What is the relationship between the measure of an inscribed angle and the measure of its intercepted arc?

\[
\text{measure of inscribed angle} = \frac{1}{2} \left(\text{measure of its intercepted arc}\right)
\]

11) What is the relationship between opposite angles in an inscribed quadrilateral?

Supplementary

(add up to 180°)

12) In Circle Q, $m\angle ABC = 288^\circ$ and QA = 10.

a. Find the circumference of the circle:

\[
C = 2\pi r
\]

\[
\approx 20\pi \approx 62.832
\]

b. Find the area of the circle:

\[
A = \pi r^2
\]

\[
\approx 314.159
\]

c. Find the length of arc AC:

\[
L = \frac{x}{360} \cdot 2\pi r
\]

\[
= \frac{12}{360} \cdot 2\pi \cdot 10
\]

\[
= 12.566
\]

d. Find the area of the shaded sector AQC:

Round your answer to three decimal places

\[
A_{\text{sector}} = \frac{x}{360} \cdot \pi r^2 = \frac{72}{360} \cdot \pi \cdot 10^2 = 20\pi
\]

\[
\approx 62.832
\]
13) Point C is the center of the circle and AB has a length of 16 cm. Find the area of the shaded region. Round your answer to three decimal places.

\[
\text{Area of circle} = \pi \cdot 8^2 = 64\pi \text{ cm}^2
\]
\[
\text{Area of triangle} = \frac{1}{2} \cdot 8 \cdot 8\sqrt{3} = 32\sqrt{3} \text{ cm}^2
\]
\[
\text{Area of shaded region} = \text{Area of circle} - \text{Area of triangle} = 64\pi - 32\sqrt{3} \approx 139.353 \text{ cm}^2
\]

14) Given the regular hexagon below and that \( PQ = 4 \) cm, find the following:

a. \( m\angle PAQ = 120^\circ \)

b. Apothem = \( 2\sqrt{3} \) cm

c. Perimeter = \( 4.6 = 24 \) cm

d. Area = \[
\frac{1}{2} \cdot 24 \cdot 2\sqrt{3} = 24\sqrt{3} \approx 41.569 \text{ cm}^2
\]

A regular hexagon can be divided into 6 equilateral triangles.

15) Find the area of the shaded region. Round your answer to three decimal places:

Area of Shaded Region = Area of Square - Area of Semicircle

\[
A_{\text{shaded region}} = 4^2 - \frac{1}{2} (\pi \cdot 2^2)
\]
\[
= 16 - 2\pi
\]
\[
A \approx 9.717 \text{ in}^2
\]
16) Find the area of sector \( AB \) in each problem below. Round your answer to three decimal places:

a. \( A = \frac{110}{360} \times \pi (8)^2 = \frac{176\pi}{9} \)
\[ A \approx 61.436 \text{ cm}^2 \]

b. \( A = \frac{54}{360} \times \pi (5)^2 = 3.75\pi \)
\[ A \approx 11.781 \text{ cm}^2 \]

17) If the area of the shaded sector below is \( 12\pi \text{ ft}^2 \), find the radius of the following circle. Round your answer to three decimal places.

\[ A = 12\pi \text{ ft}^2 \]

\[ \frac{12\pi}{\pi} = \frac{\frac{72}{360}}{r^2} \]
\[ 12 = \frac{72}{360} \cdot r^2 \]
\[ 5 (12) = \left(\frac{1}{5} \cdot r^2\right)5 \]
\[ \sqrt{100} = \sqrt{r^2} \]
\[ r = 7.074 \text{ ft} \]

18) For Ms. Pinakidis' birthday, her friends bought her a cookie cake (pictured below) with a diameter of 14 in. If she cuts the cake into 8 equal pieces and eats 2 pieces to herself, what is the area of the amount of cookie cake she ate?

\[ d = 14 \quad r = \frac{14}{2} = 7 \]

Area of one slice:
\[ A = \frac{45}{360} \pi (7)^2 = \frac{1}{8} \cdot 49\pi = 6.125\pi \]

Since Ms. P ate 2 slices,
\[ A = 2(6.125\pi) \approx 38.485 \text{ in}^2 \]

19) Given the regular octagon below with a side length of \((3x - 2)\) and an apothem of 3, find the value of \( x \) if the area is 221 \text{ units}^2.

\[ A = \frac{P \cdot a}{2} = \frac{1}{2} \cdot P \cdot a \]

\[ \text{Perimeter} = 8(3x-2) = 24x - 16 \]
\[ 221 = \frac{1}{6} (24x - 16) \cdot 3 \]
\[ 221 = (12x - 8) \cdot 3 \]
\[ 221 = 36x - 24 \]
\[ 245 = 36x - 36 \]
\[ x = \frac{245}{36} = \frac{245}{36} \]
20) Solve for x in the circle below.

\[ 4x + 33 + 96 + 50 + 2x + 13 = 360 \]
\[ 6x + 192 = 360 \]
\[ -192 \]
\[ 6x = 168 \]
\[ \frac{6x}{6} = \frac{168}{6} \]
\[ x = 28 \]

21) Find the measure and length of each bold arc shown.

a. Arc measure: **210°**
Arc length: **\( \frac{56\pi}{3} \) m**

\[ L = \frac{210}{360} \cdot 2\pi(16) = \frac{7}{12} \cdot 32\pi \]

b. Arc measure: **120°**
Arc length: **\( \frac{13\pi}{3} \) cm**

\[ L = \frac{120}{360} \cdot 2\pi(6.5) = \frac{1}{3} \cdot 13\pi \]

22) Find the value of x:

\[ 180 - 50 = 130° \]
\[ 130 = 4x + 36 \]
\[ -36 \]
\[ 94 = 4x \]
\[ \frac{94}{4} = \frac{4x}{4} \]
\[ 23.5 = x \]
23) Find $m\angle ABC$

a.)

![Diagram with triangle and angle labeled m∠ABC = 90°]

24) In the figure, find the values of $x$ and $y$.

![Diagram with triangle and angle labeled 80°]

\[ x = 360\degree - 160\degree = 100\degree \]

\[ 360\degree - 160\degree = 100\degree = y \]

25) Find the values of $x$, $y$, and $z$.

![Diagram with quadrilateral and angle labeled mBCD = z°]

\[ y = 180\degree - 102\degree = 78\degree \]

\[ z = 180\degree - 100\degree = 80\degree \]

26) How far is a 12 cm chord from the center of the circle whose radius is 10 cm? Show pictures and justify your response for full credit.

![Diagram with circle and chord labeled]

\[ x^2 + 6^2 = 10^2 \]
\[ x^2 + 36 = 100 \]
\[ x^2 = 64 \]
\[ x = 8 \]

The chord is 8 cm away from the center of the circle.

27) How long is a chord if it is 24 centimeters from the center of a circle whose radius is 26 cm? Show pictures and justify your response for full credit.

![Diagram with circle and chord labeled]

\[ 24^2 + x^2 = 26^2 \]
\[ 576 + x^2 = 676 \]
\[ x^2 = 100 \]
\[ x = 10 \]

The chord's length is $2x = 2(10) = 20$ cm.

28) Two chords are in the same circle with radius 20 cm. One is 16 cm away and one is 10 cm away. Which chord is longer?

![Diagram with circle and chords labeled]

The chord that is 116 cm away is shorter. The farther a chord is from the center of the circle, the shorter it is. The chord that is 10 cm away from the center is longer.
29) a. Find the measure of arc BC.
\[ \angle 180^\circ - 110^\circ = 70^\circ \]
\[ \mathbf{m\angle B} = 70^\circ \]

b. Find the length of arc BC
\[ L = \frac{x}{360} \cdot 2\pi r \]
\[ = \frac{70}{360} \cdot 2\pi(7) \]
\[ = \frac{49\pi}{18} \text{ cm} \]

30) a. Find the measure of arc AB.
\[ \mathbf{m\angle A} = 70^\circ \]

b. Find the length of \( AB \).
\[ L = \frac{70}{360} \cdot 2\pi(10) = \frac{35\pi}{9} \text{ cm} \]

31) The length of arc AC is 28 cm. Find the measure of the central angle AQC.
\[ \frac{x}{360} \cdot 2\pi \cdot 7 = 28 \]
\[ \frac{x}{360} \cdot 14\pi = \frac{28}{14\pi} \]
\[ \frac{x}{360} = \frac{2}{\pi} \]
\[ x = \frac{2}{\pi} \cdot 360 \]
\[ x = \frac{720}{\pi} \text{ or } x \approx 229.18 \]

**Ch 9: Scale Factor and Similarity**

32) If the side lengths of two similar polygons have a scale factor of \( \frac{1}{3} \), what is

a. The ratio of their perimeters?
\[ \frac{1}{3} \]

b. The ratio of their areas?
\[ \frac{1}{9} \]
33) Determine if these are scale figures. If so state the scale factor, treating the larger image as the original figure, and the smaller as the new figure. Fill in all missing angles. If not, change sides to make it a scale figure, and then state the scale factor.

34) The following are scale figures. State the scale factor, treating the left figure as the original. Then find the value of x.

35) The two figures below are scale figures. Fill in the missing sides and angles. Round to the nearest hundredths, if necessary.
36) You scale a polygon by the factor $\frac{2}{5}$. You then compare the original polygon to the scaled polygon. Find the ratio of each pair of measurements.

a. Any two corresponding sides of the polygons $\frac{2}{5}$ or $\frac{5}{2}$

b. Any two corresponding angles of the polygons $\frac{1}{4}$ or $1$

c. The perimeters of the two polygons $\frac{25}{4}$ or $\frac{4}{25}$

d. The areas of the two polygons

37) Given: $\triangle ABC \sim \triangle DEF$

$AB = 60 \quad BC = 56 \quad DE = 144 \quad DF = 122.5 \quad m\angle A = 64^\circ \quad m\angle E = 50^\circ$

![Diagram of triangles]

a. Find $m\angle B$: $50^\circ$

b. Find $m\angle C$: $180^\circ - 64^\circ - 50^\circ$

c. Find $m\angle D$: $64^\circ$

d. Find $m\angle F$: $64^\circ$

e. Find $AC$: $\frac{144}{122.5} \approx 51.04$

f. Find $EF$: $\frac{144}{56} \approx 2.60$

38) $\triangle QRS \sim \triangle TUV$, $QR = 12$, $RS = 34$, $UV = 115.6$, and $TV = 220$. Find the perimeter of $\triangle TUV$. Show your calculations.

![Diagram of triangles]

Perimeter of $\triangle TUV = 40.8 + 115.6 + 220 = 376.4$
39) You are looking up at a statue that is 5 feet away from you. When you look at the top of the statue, you notice that the top of the statue lines up perfectly with the top of a building. You know the height of the building is 500 feet and the height of the statue is 10 feet. How far away is the statue from the building? Hint: Draw a picture.

40) State whether the triangles are similar. Show calculations.

No, the \( \triangle s \) are not similar because \( \frac{6}{4} \neq \frac{4}{2} \) or \( \frac{2}{4} \neq \frac{4}{6} \)
Two rectangles are similar. The smaller rectangle has a base of 5 inches and a height of 3 inches. The height of the larger rectangle is 9 inches. Label the pictures. Show all work.

a) What is the base length of the larger rectangle?
\[
\frac{x}{5} = \frac{9}{3}
\]
\[x = 15\]

b) What is the ratio of the perimeters of the smaller rectangle to the larger rectangle?
\[
P_{\text{small}} = 16 \text{ in}
\]
\[
P_{\text{big}} = 48 \text{ in}
\]
\[
\frac{16}{48} = \frac{1}{3}
\]

(c) What is the ratio of the areas of the smaller rectangle to the larger rectangle?
\[
\text{Ratio of Areas} = \frac{15}{180} = \frac{1}{12} \quad \text{(scale factor)}
\]

Ch 10: Trigonometry

42) List the 3 trigonometric ratios:
1) \( \text{Sine} \ (\sin) \)
2) \( \text{Cosine} \ (\cos) \)
3) \( \text{Tangent} \ (\tan) \)

43) Express the following in terms of \( x, y, \) and \( z. \)

a. Side opposite of \( \angle C: \quad x \)

b. Side adjacent to \( \angle C: \quad z \)

c. Hypotenuse: \( y \)

d. \( \sin \angle C: \quad \frac{x}{y} \)

g. \( \sin \angle B: \quad \frac{z}{y} \)

e. \( \cos \angle C: \quad \frac{z}{y} \)

h. \( \cos \angle B: \quad \frac{x}{y} \)

f. \( \tan \angle C: \quad \frac{x}{z} \)

i. \( \tan \angle B: \quad \frac{z}{x} \)
44) Which ratio represents \( \tan A \) in \( \Delta ABC \)? (Circle one)

\[
\tan A = \frac{12}{5} \quad \text{a)} \quad \frac{5}{13} \quad \text{b)} \quad \frac{12}{13}
\]

45) \( \Delta ABC \) is a Right Triangle with \( AB = 6 \) and \( AC = 8 \).

For angle \( C \), what are the Sine, Cosine, and Tangent Ratios?

a) \( \sin C = \frac{6}{10}, \quad \cos C = \frac{8}{10}, \quad \tan C = \frac{6}{8} \)

b) \( \sin C = \frac{10}{5}, \quad \cos C = \frac{10}{8}, \quad \tan C = \frac{8}{6} \)

c) \( \sin C = \frac{8}{6}, \quad \cos C = \frac{10}{6}, \quad \tan C = \frac{10}{6} \)

d) \( \sin C = \frac{10}{6}, \quad \cos C = \frac{8}{6}, \quad \tan C = \frac{10}{8} \)

46) What is \( \cos Z \)?

\[
\cos Z = \frac{24}{30}
\]

Reduced fraction \( \frac{4}{5} \)

Decimal (to the nearest hundredth) \( 0.80 \)

47) Draw a right triangle that represents the trig ratio \( \tan(71^\circ) = \frac{8}{x} \)

48) What is \( \cos 72^\circ \) rounded to 4 decimal places?

\( 0.3090 \)

49) Solve for the measure of angle \( C \) if \( \tan \angle C = 1.5497 \)

\[ m\angle C = \tan^{-1}(1.5497) \]

\( 57.17^\circ \)
50) Solve for x. Round to 3 decimals
\[ \cos(53\degree) = \frac{x}{7} \]
\[ x = 7 \cdot \cos(53\degree) \]
\[ x \approx 4.213 \]

51) Solve for z. Round to 3 decimals
\[ \tan(72\degree) = \frac{z}{10} \]
\[ 10 \cdot \tan(72\degree) = z \]
\[ z \approx 30.777 \]

52) Solve for y. Round to 3 decimals
\[ \sin(34\degree) = \frac{7}{y} \]
\[ y \cdot \sin(34\degree) = 7 \]
\[ y = \frac{7}{\sin(34\degree)} \]
\[ y \approx 8.443 \]

53) Solve for c. Round to 3 decimals
\[ \tan(41\degree) = \frac{15}{c} \]
\[ c \cdot \tan(41\degree) = 15 \]
\[ c = \frac{15}{\tan(41\degree)} \]
\[ c \approx 17.256 \]

54) Solve for the missing angle measures. Round to the nearest degree.
\[ \tan(y) = \frac{7}{10} \]
\[ \tan^{-1}(\frac{7}{10}) = y \]
\[ y \approx 34\degree \]

\[ \sin(x) = \frac{13}{27} \]
\[ \sin^{-1}(\frac{13}{27}) = x \]
\[ x \approx 29\degree \]

55) Polygon JKL is a Right Triangle. Find the measures of JL, KL and \( \angle L \).

a) JL = 11.03 m

b) KL = 10.4 m

c) \( \angle L = 67\degree \)

\[ 180\degree - 9\degree - 23\degree = 67\degree \]

\[ \tan(23) = \frac{KL}{15} \]

\[ KL = 15 \cdot \tan(23) \]

\[ KL = 10.36 \]

\[ \cos(23) = \frac{15}{JL} \]

\[ JL = \frac{15}{\cos(23)} = 110.29 \]
56) Andrew is standing at point B, looking up at an airplane in the sky. The angle of elevation (from B to A) is 55°. What is the direct distance from Andrew to the airplane?

\[
\cos(55°) = \frac{75}{x} \\
x \cdot \cos(55°) = 75 \\
x = \frac{75}{\cos(55°)} \\
x = 130.76 \text{ ft}
\]

Ch 11: Transformations and Coordinate Geometry

57) What result will the following Scale Factors have on a Dilation?

- Scale Factor > 1: image becomes larger
- Scale Factor = 1: image stays the same (\(\cong\))
- 0 < Scale Factor < 1: image becomes smaller

58) List two transformations that preserve congruency:

Translations & Reflections

59) Which transformation creates an image that is similar to the pre-image?

Dilation

60) What is the relationship between slopes of parallel lines?

They are the same \(m_1 = m_2\)

61) What is the relationship between slopes of perpendicular lines?

They are opposite reciprocal. \((m_1)(m_2) = -1\)
62) Describe the transformation, then write a rule to represent the transformation

Translate 3 units left and 5 units down

\[(x, y) \rightarrow (x-3, y-5)\]

63) Describe the transformation, then write a rule to represent the transformation

Reflection over the x-axis

\[(x, y) \rightarrow (x, -y)\]

64) Using the graph below, what is the rule for a translation from point A to point D?

(a) \((x, y) \rightarrow (x + 4, y - 1)\)

(b) \((x, y) \rightarrow (x - 1, y + 4)\)

(c) \((x, y) \rightarrow (x - 4, y + 1)\)

(d) \((x, y) \rightarrow (x + 1, y - 4)\)

(e) \((x, y) \rightarrow (x - 1, y - 1)\)
65) Graph the quadrilateral $ABCD$ with $A(2,2)$, $B(5,1)$, $C(6,4)$, and $D(3,7)$.

a. $ABCD$ is translated to produce $A'B'C'D'$. The translation is defined by the following rule: $(x, y) \rightarrow (x+7, y+2)$. Graph $A'B'C'D'$ and list the coordinates below:

$$A' = (9, 4)$$

$$B' = (12, 3)$$

$$C' = (13, 6)$$

$$D' = (10, 9)$$

b. Describe the translation in words: "Translate 7 units right, 2 units up.

66) Given the equation of a line: $3x + y = -5$.

a) Write an equation of a line parallel to the given line, and passing through point $(1, 3)$.

Equation: $y - 3 = -3(x - 1)$

- If the line is parallel, we know it must have the same slope as the line given.

- We are also given a point, so it is best to write the equation of the parallel line in point-slope form: $y - y_1 = m(x - x_1)$ with $m = -3$, $x_1 = 1$, $y_1 = 3$.

b) Write an equation of a line perpendicular to the given line, and passing through point $(1, 3)$.

Equation: $y - 3 = \frac{1}{3}(x - 1)$

- Slope of given line was $-3$, so the slope of the line will be opposite reciprocal: $\frac{1}{3}$.
67) For the points A(-5,6) and B(15,-54)
   a. Find the distance between A and B
   \[ d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{(-5-15)^2 + (-6-(-54))^2} = \sqrt{400+3000} = \sqrt{4000} \]
   b. Find the midpoint of AB
   \[ \text{midpoint} = \left( \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right) = \left( \frac{-5+15}{2}, \frac{6-54}{2} \right) = (5, -24) \]
   c. Write the equation of a line that passes through A and B
   \[ m = \frac{-54-6}{15-(-5)} = \frac{-60}{20} = -3 \]
   \[ y-6 = -3(x+5) \text{ or } y+54 = -3(x-15) \]
   d. Write an equation of a line that is parallel to AB
   \[ y = -3x + "b" \text{ where "b" is any #!} \]
   e. Write an equation of a line that is perpendicular to AB
   If \( m_{AB} = -3 \), \( m_{\perp} = \frac{1}{3} \) opposite reciprocal slope
   \[ y = \frac{1}{3}x + "b" \text{ where "b" is any #!} \]

68) Rewrite each equation in slope intercept form, then graph.
   a.) \( 10x + 15y = 30 \)

   Re-write in slope-intercept form:
   \[ \frac{10x}{10} + 15y = 30 \]
   \[ \frac{15y}{15} = \frac{-10x}{15} + \frac{30}{15} \]
   \[ y = -\frac{2}{3}x + 2 \]

   b.) \( 9x - 12y = 36 \)

   Re-write in slope-int. form:
   \[ -12y = -9x + 36 \]
   \[ y = \frac{3}{4}x - 3 \]
69) Triangle ABC is shown to the right.

a) What is the Slope of a line Perpendicular to AB?
Slope = \( \frac{-1}{7} \)

\[ M_{AB} = \frac{6 - (-8)}{4 - 6} = \frac{14}{-2} = -7 \]

(\text{opposite reciprocal})

b) What is the Slope of a line Parallel to AC?
Slope = \( \frac{4}{3} \)

\[ M_{AC} = \frac{6 - (-2)}{4 - (-2)} = \frac{8}{6} = \frac{4}{3} \]

Parallel = same slope \( \Rightarrow M_{ll} = \frac{4}{3} \)

70) Which of the following equations represents a line that is Parallel to the line with the equation \( 8x + 2y = 10 \) and has a \( y \)-intercept of 8?

a) \( -4x + y = 5 \) \( \text{Yes/No} \) \( m = 4 \)

\[ y = 4x + 5 \]

\( \times \) (b) \( 4x + y = 8 \) \( \text{Yes/No} \) \( m = -4 \)

\[ y = -4x + 8 \]

c) \( 8x - 2y = 10 \) \( \text{Yes/No} \) \( m = 4 \)

\[ y = 4x - 5 \]

d) \( 8x + 2y = 4 \) \( \text{Yes/No} \) \( m = -4 \)

\[ y = -4x + 2 \]

\( \times \) Same slope as given line, but y-int. is not 8!