

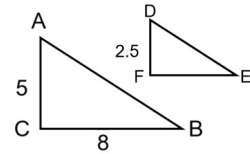
## Exam Part 1

(Similar Triangles, Trigonometry, Linear Systems, Analytic Geometry)  
[40 marks]

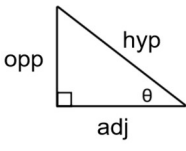
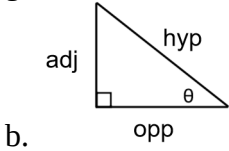
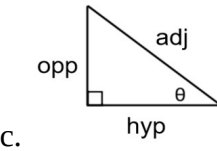
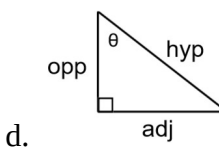
Part A: Multiple Choice [10 marks]

1. In the diagram,  $\triangle ABC \sim \triangle DEF$ . What is the length of EF?

- a. 4                                      b. 5.5  
c. 16                                      d. 100

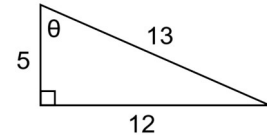


2. Which of the following right-triangles has been correctly labeled with respect to  $\theta$ ?

- a.       b.       c.       d. 

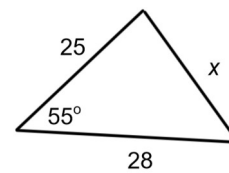
3. Which of the following ratios is **correct** for the triangle shown?

- a.  $\sin \theta = \frac{12}{13}$                       b.  $\cos \theta = \frac{12}{13}$   
c.  $\tan \theta = \frac{12}{13}$                       d.  $\tan \theta = \frac{5}{12}$



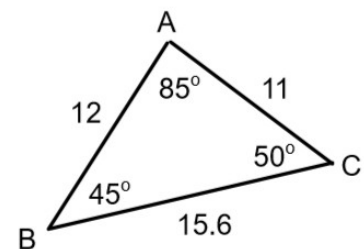
4. What rule should you use to directly solve for  $x$ ?

- a. Cosine Law                      b. Sine Law  
c. Tangent Law                      d. Coleslaw



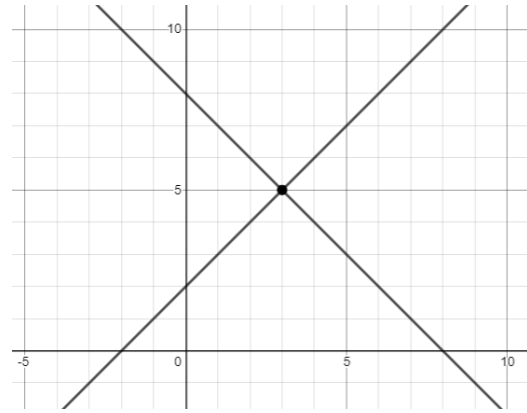
5. Which of the following is a correct demonstration of the Sine Law for the triangle, shown right?

- a.  $\frac{15.6}{\sin 85} = \frac{11}{\sin 45}$       b.  $\frac{12}{\sin 50} = \frac{11}{\sin 85}$   
c.  $\frac{85}{\sin 15.6} = \frac{45}{\sin 11}$       d.  $\frac{50}{\sin 12} = \frac{85}{\sin 11}$



6. Which of the following points is on the line  $3x + 2y = 9$  ?  
a. (2, 1)      **b. (1, 3)**      c. (4.5, 0)      d. (4, -1)

7. What is the **solution** of the system shown?  
a. (5, 3)      **b. (3, 5)**  
c. (8, 8)      d. (0, 2)



8. What is the **midpoint** of the points J(1, 4) and K(-1, 18)?  
a. (1, -14)      **b. (0, 11)**      c. (0.5, -5)      d. (0, 13)
9. What is the distance between the points P(-3, 4) and Q(2, -8)?  
a. 4.12      **b. 13**      c. 12.04      d. 6.40
10. What is the radius of the circle given by  $x^2 + y^2 = 36$  ?  
a. 18      **b. 6**      c. 36      d. 1296

- Bonus.** What is the loudest sound we've heard in class this quadmester?  
a. The Fire Alarm      b. O Canada on the P.A. system  
**c. Seth's head slamming on the desk**      d. Andrew saying "it's too quiet in here!!"

Part B: Definition Matching [10 marks]

For each definition, write the letter corresponding to the appropriate word from the work bank in the space beside it. (An example has been done for you.) There are (a lot) more words that definitions, so be careful!

Word Match	Definition
<b>W</b>	The point where the three medians of a triangle meet.
<b>P</b>	Used to find the length of a line segment
<b>A</b>	Corresponding angles are equal and corresponding sides are proportional
<b>I</b>	From a table of values, these are constant in a linear relationship
<b>N</b>	The point on a line segment that is equally distant from both endpoints
<b>T</b>	A line from a vertex that is perpendicular to the opposite side; the “height” of a triangle
<b>B</b>	Corresponding angles and sides are equal
<b>R</b>	Two lines whose slopes are negative reciprocals of each other
<b>U</b>	The point where the three perpendicular bisectors of a triangle meet.
<b>S</b>	A line that is perpendicular to and passes through the midpoint of a line segment
<b>H</b>	A relationship whose graph is a straight line

WORD BANK

- A. Similar
- B. Congruent
- C. Sine
- D. Cosine
- E. Tangent
- F. Sine Law
- G. Cosine Law
- H. Linear
- I. First Differences
- J. Linear System
- K. Solution
- L. Substitution
- M. Elimination
- N. Midpoint
- O. Median
- P. Distance Formula
- Q. Parallel Lines
- R. Perpendicular Lines
- S. Perpendicular Bisector
- T. Altitude
- U. Circumcenter
- V. Orthocenter
- ~~W. Centroid~~

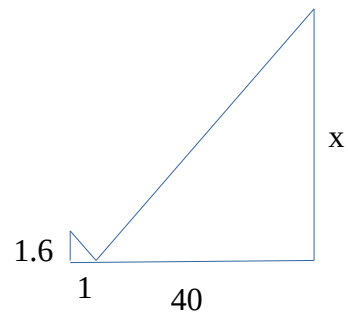
Part C: Problem Solving

Complete any 5 of the following 6 problems. Each problem is worth 4 marks.

1. A puddle sits 40m from the base of a tree. Gracie, who is 1.6m tall, can just see the top of the tree if she is standing 1m from the puddle. How tall is the tree?



$$\frac{x}{40} = \frac{1.6}{1}$$
$$x = 64$$

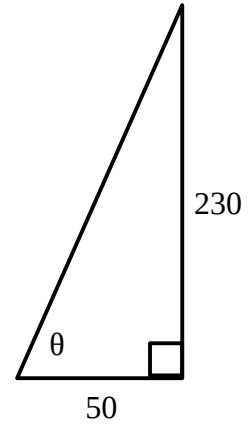


2. Spider-Man is standing on the ground 50ft in front of an apartment building that is 230ft tall.  
a. At what angle of elevation must he fire his web-shooter to hit the edge of the roof?

$$\begin{aligned}\tan \theta &= \frac{230}{50} \\ \theta &= \tan^{-1}(4.6) \\ \theta &= 77.7\end{aligned}$$

- b. What length of webbing will be let out to reach the top of the roof?

*There are lots of ways to solve this one, either by sin / cos or Pythagorean Theorem.*



$$\begin{aligned}\sin 77.7 &= \frac{230}{h} \\ h \sin 77.7 &= 230 \\ h &= \frac{230}{\sin 77.7} \\ h &= 235.4\end{aligned}$$

~ or ~

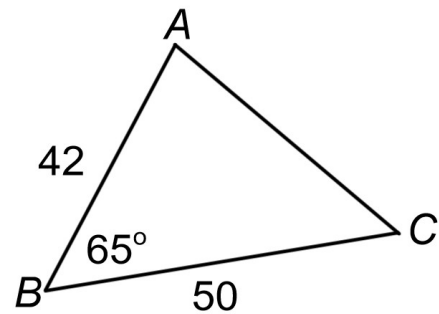
$$\begin{aligned}a^2 + b^2 &= c^2 \\ 230^2 + 50^2 &= c^2 \\ 55400 &= c^2 \\ 235.4 &= c\end{aligned}$$

3. Solve the following triangle:

*We must start with cosine law to find side b.*

Side b:

$$\begin{aligned}b^2 &= a^2 + c^2 - 2ac \cos B \\b^2 &= 50^2 + 42^2 - 2(50)(42) \cos 65 \\b^2 &= 2489 \\b &= 49.9\end{aligned}$$



*Angle A and C can be solved for in any order.*

Angle A:

$$\begin{aligned}\frac{\sin A}{a} &= \frac{\sin B}{b} \\ \frac{\sin A}{50} &= \frac{\sin 65}{49.9} \\ \sin A &\approx 0.9081 \\ A &= 65.2\end{aligned}$$

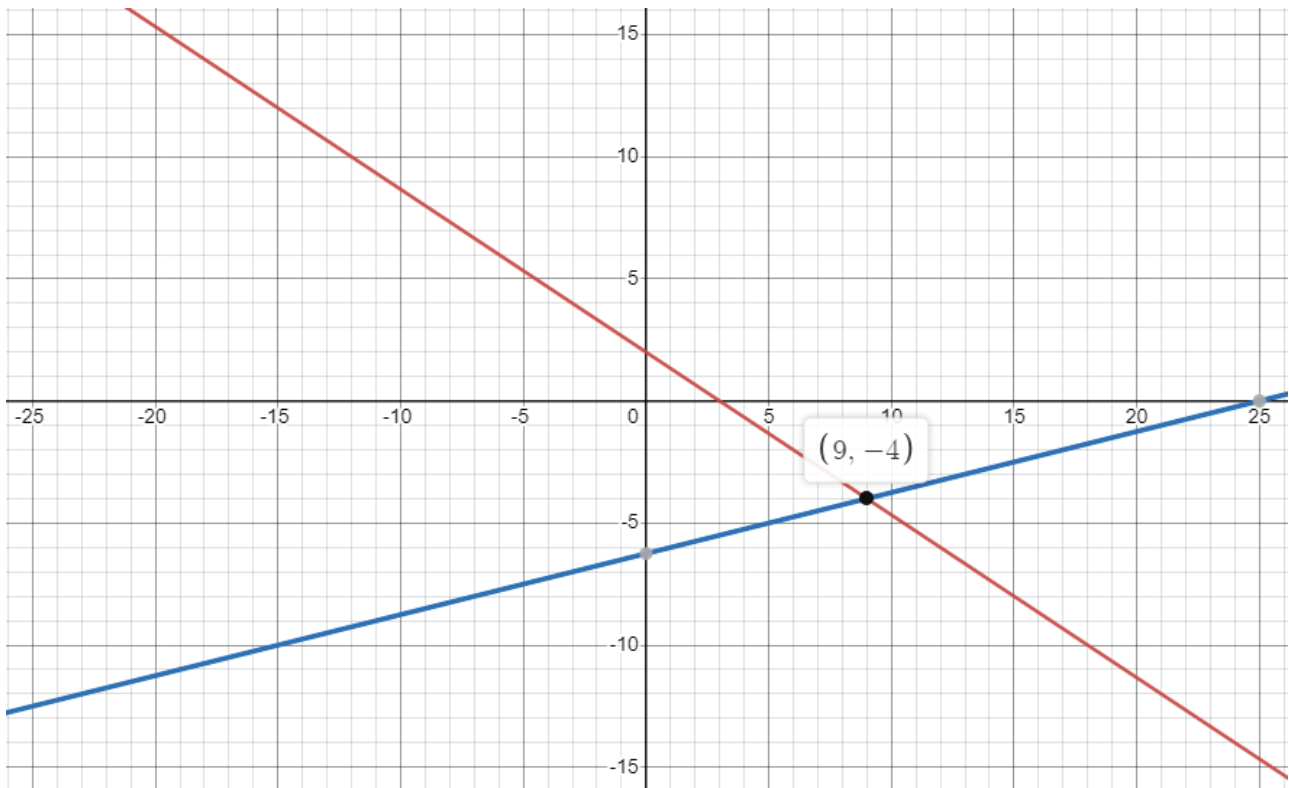
Angle C:

$$180 - 65 - 65.2 = 49.8^\circ$$

4. Solve the following system of linear equations. (Your choice of method – graphing, substitution, or elimination.)

$$\begin{aligned} 2x + 3y &= 6 \\ x - 4y &= 25 \end{aligned}$$

<i>Substitution</i>	<i>Elimination</i>
$x - 4y = 25$ $x = 4y + 25$  $2(4y + 25) + 3y = 6$ $8y + 50 + 3y = 6$ $11y = -44$ $y = -4$  $x = 4y + 25$ $x = 4(-4) + 25$ $x = 9$  <i>Solution is (9, -4).</i>	$2x + 3y = 6$ $x - 4y = 25$ $\quad -x \rightarrow \underline{2x - 8y = 50}$ $\qquad\qquad 11y = -44$ $\qquad\qquad y = -4$  $x - 4y = 25$ $x - 4(-4) = 25$ $x + 16 = 25$ $x = 9$  <i>Solution is (9, -4)</i>



5. For Grade 8 orientation day, the school orders pepperoni pizzas (\$8 each) and vegetarian pizzas (\$10 each). Fifty pizzas are ordered for a total cost of \$427.



- a. Write a system of linear equations that represent this situation.

Let  $p$  be the pepperoni pizzas,  $v$  the vegetarian.

$$\begin{aligned} p + v &= 50 \\ 8p + 10v &= 427 \end{aligned}$$

- b. How many of each type of pizza were ordered?

*This can be solved by substitution as well, but elimination is shown below*

$$\begin{array}{rcl} p + v = 50 & \text{--x10-->} & 10p + 10v = 500 \\ 8p + 10v = 427 & \text{----->} & \underline{8p + 10v = 427} \\ & & 2p = 73 \\ & & p = 36.5 \end{array}$$

$$\begin{aligned} (36.5) + v &= 50 \\ v &= 13.5 \end{aligned}$$

Therefore there were 36 pepperoni pizzas, 13 vegetarian pizzas, and one that was half-pepperoni-half-vegetarian.

6. A circle passes through the points A(-4,-3), B(4, 3), and C(5,0).

a. Determine the equation of the circle.

$$\begin{aligned}x^2 + y^2 &= r^2 \\4^2 + 3^2 &= r^2 \\25 &= r^2\end{aligned}$$

$$x^2 + y^2 = 25$$

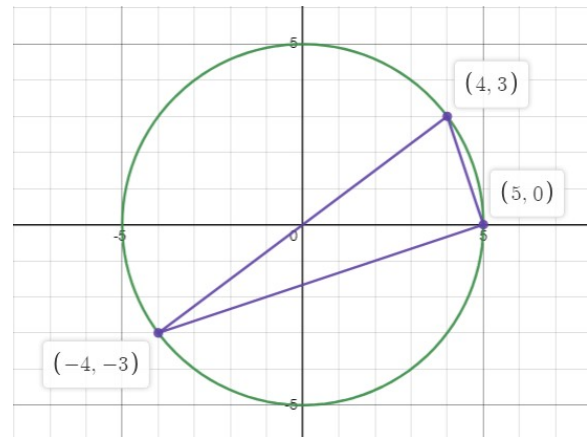
b. Show that triangle ABC is a right-angled triangle.

We need to check the **slope** of each side.

$$m_{AB} = \frac{3 - (-3)}{4 - (-4)} = \frac{6}{8} = \frac{3}{4}$$

$$m_{AC} = \frac{0 - (-3)}{5 - (-4)} = \frac{3}{9} = \frac{1}{3}$$

$$m_{BC} = \frac{0 - 3}{5 - 4} = \frac{-3}{1}$$



The slopes of AC and BC are *negative reciprocals*; therefore, the triangle is right-angled.