Answer Key.

Math II: 2nd Semester Material Pre-Test

Unit 3: Comparing Functions – Modeling and Transformations

Find the equation of the line that goes through the given points.

1. A linear equation through the points (-6, 38) and (3, -16).

Method 1:

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-16-38}{3-(-6)} = \frac{-54}{9} = -6$

$y = -6x + b$

Using $(3, -16)$ $\quad -16 = -6(3) + b$

$-16 = -18 + b$

$+18 \quad +18$

$2 = b$

* $\boxed{y = -6x + 2}$

Method 2 $\quad y = mx + b$

$-16 = 3m + b \rightarrow -16 = 3(-6) + b$

$-(38 = -6m + b) \quad -16 = -18 + b$

$\frac{-54}{9} = \frac{9m}{9} \quad +18 \quad +18$

$-6 = m \quad 2 = b$

$\boxed{y = -6x + 2}$

2. A quadratic equation through the points (-4, -66), (0, -10), and (3, -31).

$y = ax^2 + bx + c$

$-66 = a(-4)^2 + b(-4) + c \qquad -10 = a(0)^2 + b(0) + c \qquad -31 = a(3)^2 + b(3) + c$

$-66 = 16a - 4b + c \qquad \boxed{-10 = c} \qquad -31 = 9a + 3b + c$

$-66 = 16a - 4b - 10 \qquad -31 = 9a + 3b - 10$

$+10 \quad +10 \qquad +10 \quad +10$

$\frac{-56}{4} = \frac{16a}{4} - \frac{4b}{4} \qquad \frac{-21}{3} = \frac{9a}{3} + \frac{3b}{3}$

$-14 = 4a - b \qquad -7 = 3a + b$

$-7 = 3a + \cancel{b}$

$-14 = 4a - \cancel{b}$

$\frac{-21}{7} = \frac{7a}{7}$

$\boxed{-3 = a}$

$-7 = 3(-3) + b$

$-7 = -9 + b$

$+9 \quad +9$

$\boxed{2 = b}$

* $\boxed{y = -3x^2 + 2x - 10}$

3. An exponential equation through the points (2, 63) and (8, 45927).

* $\boxed{y = 7(3)^x}$

method 1: $y = ab^x$

$\frac{63}{b^2} = \frac{a\cancel{b^2}}{\cancel{b^2}} \qquad 45927 = ab^8$

$a = \frac{63}{b^2} \qquad 45927 = \frac{63}{b^2} \cdot \frac{b^8}{1}$

$a = \frac{63}{3^2} \qquad \frac{45927}{63} = \frac{63b^6}{63} \qquad \boxed{b = 3}$

$a = \frac{63}{9} = 7 \qquad \sqrt[6]{729} = \sqrt[6]{b^6}$

Method 2

$\frac{45927 = ab^8}{63 = ab^2}$

$\sqrt[6]{729} = \sqrt[6]{b^6}$

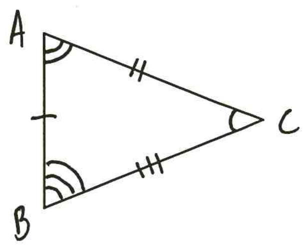
$\boxed{3 = b}$

$\frac{63}{3^2} = \frac{a(3)^2}{3^2}$

$\boxed{7 = a}$

Unit 4: Similarities

4. Given the following triangles, provide CONGRUENCE statements for the angles and sides that will show that Δ ABC ≅ Δ XYZ:

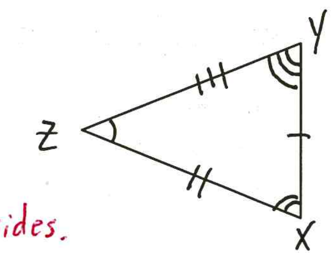


$\angle A \cong \angle X$
$\angle B \cong \angle Y$
$\angle C \cong \angle Z$

3 sets congruent ∠'s.

$\overline{AB} \cong \overline{XY}$
$\overline{BC} \cong \overline{YZ}$
$\overline{AC} \cong \overline{XZ}$

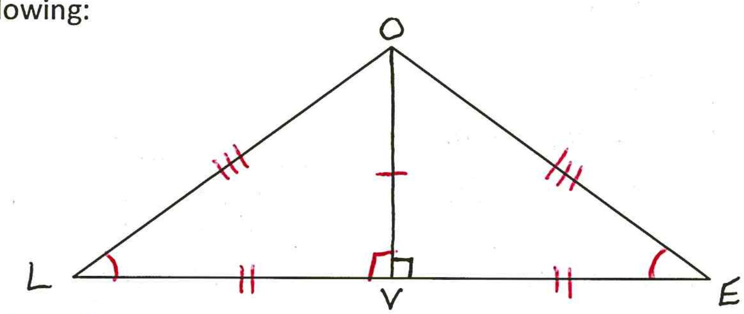
3 sets congruent sides.



5. Write a two column proof for the following:

Given: OV ⊥ LE
OV bisects LE
Δ LOE is an isosceles

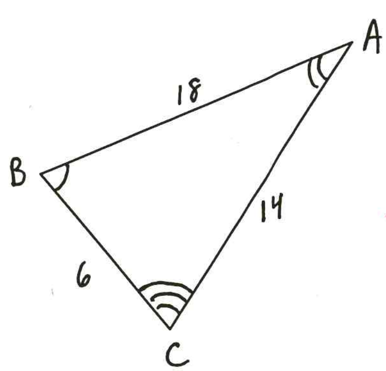
Prove: Δ LOV ≅ Δ EOV



Can use: SSS, SAS, ASA, AAS, or HL.

Useable Statements	Reasons
① $\overline{OV} \cong \overline{OV}$	① Reflexive Property.
② $\overline{LV} \cong \overline{VE}$	② Def. Bisects.
③ $\overline{OL} \cong \overline{OE}$	③ Def. Isosceles Δ.
④ $\angle L \cong \angle E$	④ Def. Isosceles Δ
⑤ $\angle OVL$ + $\angle OVE$ are Rt. ∠'s	⑤ Def Perpendicular (⊥)
⑥ $\angle OVL \cong \angle OVE$	⑥ Rt. ∠'s ≅ Thm.

6. Given the following triangles, provide SIMILARITY statements for the angles and sides that will show that Δ ABC ~ Δ XYZ:

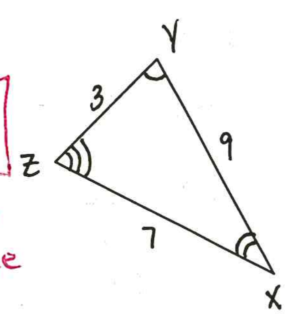


$\angle A \cong \angle X$
$\angle B \cong \angle Y$
$\angle C \cong \angle Z$

3 sets congruent Angles.

$$\boxed{\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ} = \frac{2}{1}}$$

Showed all ratio of sides are the same number.



7. Write a two column proof for the following:

Given: QR || TU

QR = 5

QS = 3

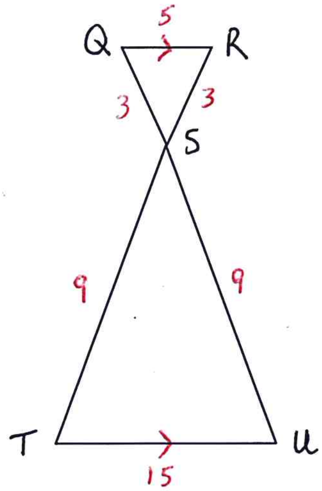
RS = 3

ST = 9

SU = 9

TU = 15

Prove: Δ SQR ~ Δ SUT



Useable Statements	Reasons
① $\angle Q \cong \angle U$	① Alternate Interior ∠'s.
② $\angle R \cong \angle T$	② Alternate Interior ∠'s
③ $\angle QSR \cong \angle UST$	③ Vertical Angles
④ $\frac{SQ}{SU} = \frac{3}{9} = \frac{1}{3}$	④ Divided Top + Bottom by 3.
⑤ $\frac{QR}{UT} = \frac{5}{15} = \frac{1}{3}$	⑤ Divided Top + Bottom by 5.
⑥ $\frac{SR}{ST} = \frac{3}{9} = \frac{1}{3}$	⑥ Divided Top + Bottom by 3.
⑦ $\frac{SQ}{SU} = \frac{QR}{UT} = \frac{SR}{ST} = \frac{1}{3}$	⑦ Transitive Property.

Unit 5: Right Triangles and Trigonometry

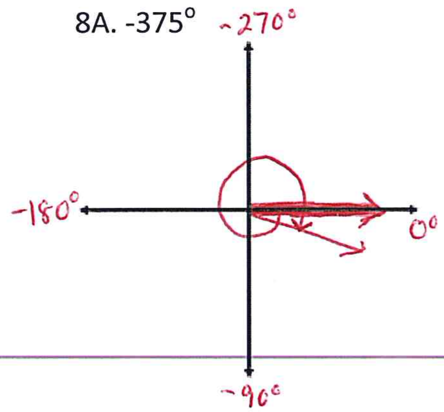
Given the following angle:

A. Draw the angle in standard form.

B. Find one (1) positive and one (1) negative coterminal angle of the given angle.

C. Find the reference angle of the given angle.

8A. -375°



$$\begin{array}{r} -375^\circ \\ +\ 360^\circ \\ \hline -15^\circ \end{array}$$

Find the # of full rotations.

Remember to draw initial side on pos. x-axis.

Remember arrow at the end of your spiral rotations showing direction.

8B.

Positive Coterminal

$-375^\circ + 360^\circ = -15^\circ + 360 = \boxed{345^\circ}$

Negative Coterminal

$-375^\circ + 360^\circ = \boxed{-15^\circ}$

OR

$-375^\circ - 360^\circ = \boxed{-735^\circ}$

8C.

Reference Angle = 15°

ALWAYS POSITIVE!

Evaluate each of the following using the Hand Trick:

9. sin(-225°)

Reference Angle = 45°
Falls in Quadrant II
$\boxed{\frac{\sqrt{2}}{2}}$

10. cos(390°)

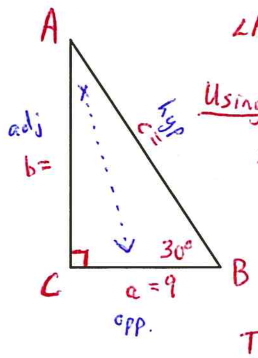
Reference Angle = 30°
Falls in Quadrant I
$\boxed{\frac{\sqrt{3}}{2}}$

Remember the phrase All Students Take Calculus

II	I
sin +	All +
tan +	cos +
III	IV

Solve each of the following triangles:

11. Given the RIGHT triangle with right ∠ C
∠B = 30° & a = 9



$\angle A = 180° - 90° - 30° = \boxed{60°}$

Using ∠A

$\sin 60 = \frac{9}{c}$

$\frac{c \sin 60}{\sin 60} = \frac{9}{\sin 60}$

$\boxed{c \approx 10.4}$

$\tan 60° = \frac{9}{b}$

$\frac{b \tan 60}{\tan 60} = \frac{9}{\tan 60}$

$\boxed{b \approx 5.2}$

12. Given the Non-Right Triangle:
∠A = 103°, a = 26, & c = 6

Law of Sines:

$\frac{\sin 103}{26} = \frac{\sin B}{b} = \frac{\sin C}{6}$

$\frac{\sin 103}{26} \times \frac{\sin C}{6}$

$\frac{26 \sin C}{26} = \frac{6 \sin 103}{26}$

$\sin^{-1}(\sin C) = \sin^{-1}\left(\frac{6 \sin 103}{26}\right)$

$\boxed{C \approx 13°}$

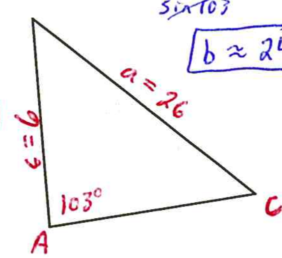
$\angle B = 180 - 103 - 13$

$\boxed{\angle B \approx 64°}$

$\frac{\sin 103}{26} \times \frac{\sin 64}{b}$

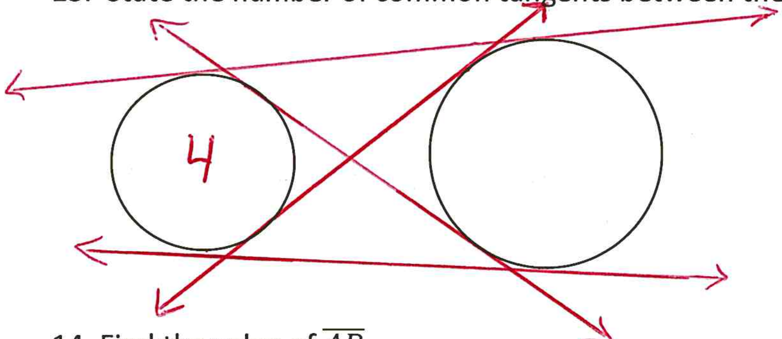
$\frac{b \cancel{\sin 103}}{\cancel{\sin 103}} = \frac{26 \sin 64}{\sin 103}$

$\boxed{b \approx 24}$



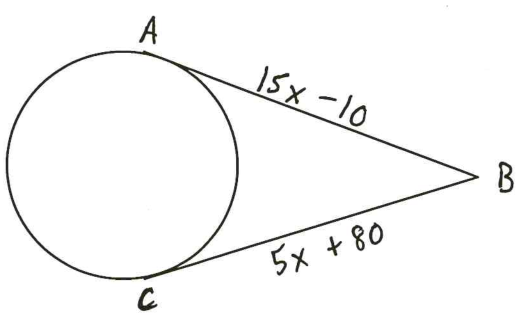
Unit 7: Circles:

13. State the number of common tangents between the given circles, and then draw them.



Remember to state the number of tangents AND draw them!

14. Find the value of $\overline{AB}$.



$15x - 10 = 5x + 80$
$-5x \qquad -5x$

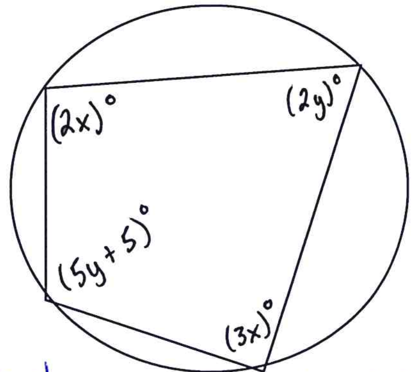
$10x - 10 = 80$
$+10 \qquad +10$

$\frac{10x}{10} = \frac{90}{10}$

$x = 9$

Plug into $AB = 15x - 10 = 15(9) - 10 = 135 - 10 = \boxed{125}$

15. Find the value of all variables:



$2x + 3x = 180$

$\frac{5x}{5} = \frac{180}{5}$

$\boxed{x = 36}$

$5y + 5 + 2y = 180$

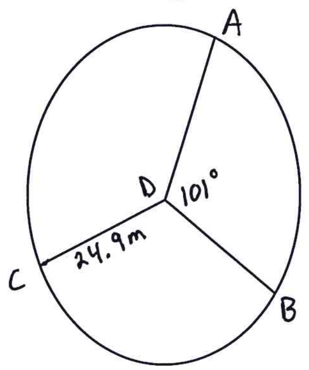
$7y + 5 = 180$
$\quad -5 \quad -5$

$\frac{7y}{7} = \frac{175}{7}$

$\boxed{y = 25}$

Remember opposite angles ADD to be 180°

16. In the following ∠ ADC ≅ ∠BDC. Find the length of $\widehat{AB}$.

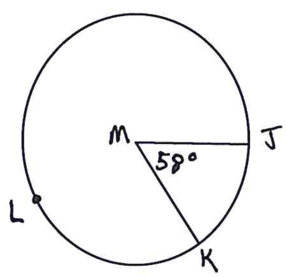


$\widehat{AB} = \frac{m\widehat{AB}}{360} \cdot 2\pi r$

$\widehat{AB} = \frac{101}{360} \cdot 2\pi(24.9)$

$\boxed{\widehat{AB} = \frac{8383\pi}{600} \approx 43.89328536...}$

17. Find the area of circle M, given the area of the sector is 36.07 cm²



$A_{sec} = \frac{m\widehat{JK}}{360} \cdot \pi r^2$

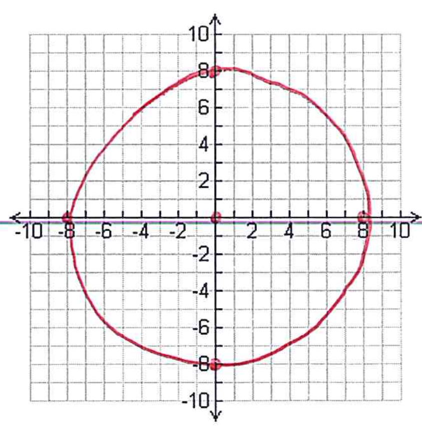
$A_{sec} = \frac{m\widehat{JK}}{360} \cdot A$

$\frac{360}{58}\left[36.07 = \frac{58}{360} \cdot A\right]\frac{360}{58}$

$\boxed{A = \frac{32463}{145} \approx 223.8827586...}$

Graph each of the following equations:

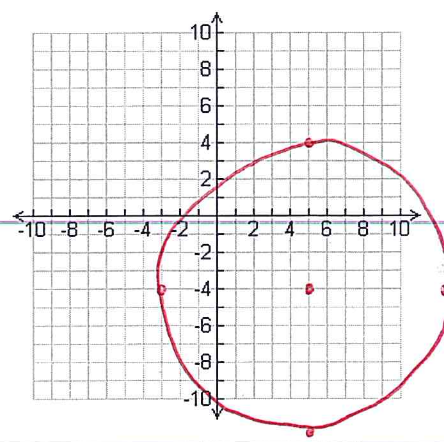
18. $x^2 + y^2 = 64$



$c = (0, 0)$

$r = \sqrt{64} = 8$

19. $x^2 + y^2 - 10x + 8y - 23 = 0$



$x^2 - 10x + y^2 + 8y = 23$

$x^2 - 10x + (-5)^2 + y^2 + 8y + (4)^2 = 23 + (-5)^2 + (4)^2$

$(x-5)^2 + (y+4)^2 = 64$

$\boxed{c = (5, -4)}$

$\boxed{r = \sqrt{64} = 8}$