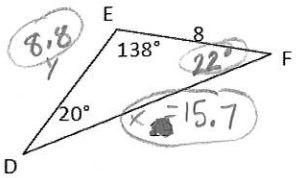
$\frac{\sin A}{a} = \frac{\sin B}{b}$ $c^2 = a^2 + b^2 - 2ab\cos C$ Key

PC Midterm Review #2

Law of Sines/Cosines, Vectors, Sequences and Series

Solve each of the following triangles using either the law of sines or cosines.

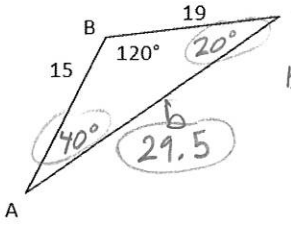
1.)



$\frac{\sin 20°}{8} = \frac{\sin 138}{x}$ $x = 15.7$

$\frac{\sin 20}{8} = \frac{\sin 22}{y}$ $y = 8.8$

2.)



$b^2 = 15^2 + 19^2 - 2(15)(19)\cos 120°$

$586 - 570\cos 120$

$586 + 285$

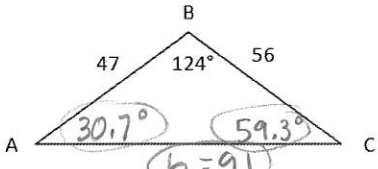
$\sqrt{b^2} = \sqrt{871}$ $b = 29.5$

$\frac{\sin A}{19} = \frac{\sin 120}{29.5}$

$A = 33.9° \approx 40°$

2 ΔS

3.)



$b^2 = 47^2 + 56^2 - 2(47)(56)\cos 124$

$5345 - 5264(\cos 124$

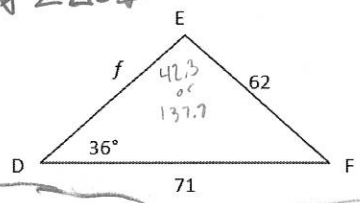
$5345 + 2943.6$

$b = 91.$

$\frac{\sin 124}{91} = \frac{\sin A}{56}$

$A = 30.7$

4.)



$\frac{\sin 36°}{62} = \frac{\sin E}{71}$

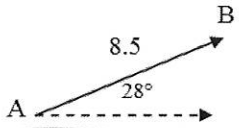
$E = 42.3$

Δ1		Δ2	
$m\angle D = 36°$	$EF = 62$	$m\angle D = 36°$	$EF = 62$
$m\angle E = 42.3°$	$DF = 71$	$m\angle E = 137.7°$	$DF = 71$
$m\angle F = 101.7°$	$DE = 103.3$	$m\angle F = 6.3°$	$DE = 11.6$

$\frac{\sin 36}{62} = \frac{\sin 101.7}{x}$ $x = 103.3$

$\frac{\sin 36}{62} = \frac{\sin 6.3}{y}$ $y = 11.6$

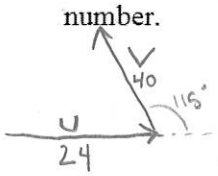
5.) What is the magnitude and direction of $\overrightarrow{AB}$?



Mag: 8.5

Direction: 28°

6.) Vector *u* has a magnitude of 24 and a direction of 0°. Vector *v* has a magnitude of 40 and a direction of 115°. Find the magnitude and direction of the resultant to the nearest whole number.



u	v
$x = 24$	$x = -16.9$
$y = 0$	$y = 36.3$

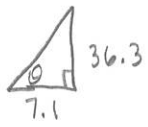
Resultant $x = 7.1$

$y = 36.3$

$\sin 65 = \frac{x}{40}$

$\cos 65 = \frac{x}{40}$

$x = 16.9$

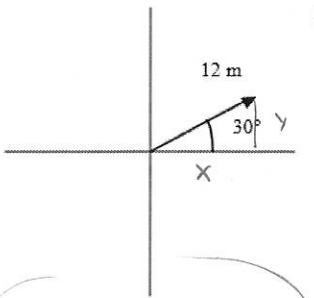


$7.1^2 + 36.3^2 = c^2$

$c = 36.99 \approx 37$ magnitude

$\tan^{-1}\left(\frac{36.3}{7.1}\right) = 78.9°$ Direction

7.) **Find the x and y components of each of the following vectors.**

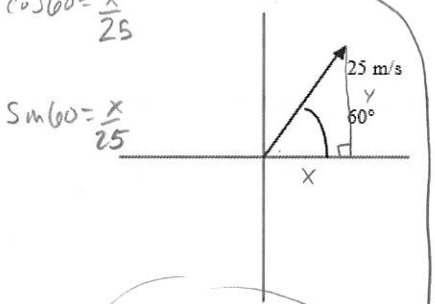


$\cos 30 = \frac{x}{12}$

$\sin 30 = \frac{y}{12}$

x = 10.4

y = 6



$\cos 60 = \frac{x}{25}$

$\sin 60 = \frac{x}{25}$

x = 12.5

y = 21.7

$a_n = a_1 + (n-1)d$ $\quad a_n = a_1 r^{n-1}$

PC Midterm Review #2

Use the formulas provided to you to complete the following. Determine what type of sequence the following are and then complete the problem.

8. a=-5, d=4, n=9; find the nth term

$a_9 = -5$ $\quad -5 = a_1 + (9-1)4$ $\quad -5 = a_1 + 8(4)$ $\quad -32 \quad -32$ $\quad a_1 = -37$

$a_n = -37 + (n-1)4$ $\quad -37 + 4n - 4$ $\quad a_n = 4n - 41$

9. a=5, n=4, r=3; find the nth term

$a_4 = 5$ $\quad 5 = a_1(3)^{4-1}$ $\quad \frac{5}{27} = \frac{a_1 3^3}{27}$ $\quad a_1 = 5/27$

$a_n = 5/27\,(3)^{n-1}$

10. a=3, d=-4, n=6; find the nth term

$a_6 = 3$ $\quad 3 = a_1 + (6-1)(-4)$ $\quad 3 = a_1 + (-20)$ $\quad 23 = a_1$

$a_n = 23 + (n-1)(-4)$ $\quad 23 + -4n + 4$ $\quad a_n = -4n + 27$

11. a=-4, n=6, r=-2; find the nth term

$a_6 = -4$ $\quad -4 = a_1(-2)^{6-1}$ $\quad \frac{-4}{-32} = \frac{a_1(-2)^5}{-32}$ $\quad a_1 = 1/8$

$a_n = (\frac{1}{8})(-2)^{n-1}$

Find the missing terms in each sequence. You are given what type of sequence represents each one.

12. 2/9, 2/3, 2, 6, 18, 54 (geometric)

13. 3, 26/3, 43/3, 20 (arithmetic)

$20 = 3 + (4-1)d$ $\quad 20 = 3 + 3d$ $\quad -3 \quad -3$ $\quad \frac{17}{3} = \frac{3d}{3}$ $\quad d = 17/3$

14. 32, 48, 72, 108, 162 (geometric)

$a_5 = 162$ $\quad \frac{162}{32} = \frac{32(r)^{5-1}}{32}$ $\quad \sqrt[4]{\frac{81}{16}} = \sqrt[4]{r^4}$ $\quad \frac{3}{2} = r$

15. Find the 15th term for the arithmetic sequence -3, 3, 9, … $\quad d = 6$ $\quad a_1 = -3$

$a_{15} = -3 + (15-1)(6)$ $\quad -3 + 14(6)$

$a_{15} = 81$

16. Find the first 4 terms of the geometric sequence with a=-6 and r=-2/3

Find S_n for each series described. You will need to determine if the series is arithmetic or geometric.

17. Geometric $\quad r = 1/2$

160 + 80 + 40 + … , n=6

$S_6 = \frac{160(1-(1/2)^6)}{1-1/2} = \frac{160(\frac{63}{64})}{1/2} = 315$

18. Geometric

$a_7 = 5$ $\quad$ Find a_1 $\quad 5 = a_1(-1/2)^6$ $\quad 5 = a_1(\frac{1}{64})$ $\quad a_1 = 320$

$S_7 = \frac{320(1-(-1/2)^7)}{1+1/2}$ $\quad \frac{320(\frac{129}{128})}{3/2}$

$S_7 = 215$

Find "a" for each geometric series.

19. S_n=-55, r=-2/3, n=5

20. S_n=2457, a=3072, r=-4