Ch.4 Factoring + Trig Test Version 3

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Date: 12/4/2020 Pd. 1

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

Read all directions carefully.
Watch out for simple, careless errors.
Make sure all figures are labeled appropriately.
Please indicate all answers clearly so they are easy to locate.
Show ALL work you have done to receive full credit for your answer.

1) (5 pts.) Draw a rectangle using algebra tiles for the expression $2x^2 + 7x + 5$. Sketch your rectangle and write the area as a sum and as a product.

	x	1
5	$5x$	5
$2x$	$2x^2$	$2x$

a^2+b+c

$a=2 \quad b=7 \quad c=5$

$x = \frac{-7 \pm \sqrt{7^2-4\cdot2\cdot5}}{2\cdot2}$

$x = \frac{-7 \pm \sqrt{72-40}}{4}$

$x = \frac{-7 \pm \sqrt{9}}{4}$

$x = \frac{-7 \pm 3}{4}$

$x = \frac{-7+3}{4}$ so $x = -1$ $\Leftarrow$ $x+1=0$

or

$x = \frac{-7-3}{4}$ so $x = \frac{-10}{4} = \frac{-5}{2}$

so $x+\frac{5}{2}=0$

$2\cdot x+\frac{5}{2}\cdot 2=0$

$2x+5=0$

2) (3 pts.) **Multiple Choice:** The quadratic expression $6x^2+6x-12$ has several possible sets of factors. Which set of factors below is not a possible answer? Explain how you know.

a. $6(x-1)(x+2)$

$6(x-1)(x+2)$

$6x^2+12x-6x-12$

$6x^2+6x-12$ correct

b. $(6x-6)(x+2)$

b. $(6x-6)(x+2)$

$6x^2+12x-6x-12$

$6x^2+6x-12$ correct!

c. $(x-6)(6x+2)$

c. $(x-6)(6x+2)$

$6x^2+12x-36x-12$

$6x^2-34x-12$

wrong! this is because it's -34 and not $6x$

d. $(3x-3)(2x+4)$

d. $(3x-3)(2x+4)$

$6x^2+12x-6x-12$

$6x^2+6x-12$

correct!

3) (8 pts) Factor the following quadratics if possible. If a quadratic cannot be factored, explain why not.

a. $2x^2-11x+12$

$2x^2-11x+12$

a^2+b+c

$a=2 \quad b=-11 \quad c=12$

$x = \frac{-11 \pm \sqrt{11^2-4\cdot2\cdot12}}{2\cdot2}$

$x = \frac{-11 \pm \sqrt{11^2-96}}{4}$

$x = \frac{-11 \pm \sqrt{25}}{4}$

$x = \frac{-11 \pm 5}{4}$

so $\frac{11+5}{4}$ or $\frac{11-5}{4}$

$\frac{16}{4}=4$ $\quad$ $\frac{6}{4}=\frac{3}{2}$

$x-4=0$

	$2x$	-3
x	$2x^2$	$-3x$
-4	$-8x$	12

$(x-4)(2x-3)$

$2x^2-3x-8x+12$

$=2x^2-11x+12$

correct!

b. y^2+7y+7

this cannot be factored because this problem could not be solved completely. the square root of 21 could not be completed and so this quadratic cannot be factored.

c. $5m^2-14m+8$

$5m^2-14m+8$

a^2+b+c

$a=5 \quad b=-14 \quad c=8$

$m = \frac{14 \pm \sqrt{-14^2-4\cdot5\cdot8}}{2\cdot5}$

$m = \frac{14 \pm \sqrt{14^2-160}}{10}$

$m = \frac{-14 \pm \sqrt{36}}{10}$

-14 ± 6

$m = \frac{14+6}{10}$ $\quad$ $\frac{20\div10}{10\div10}$ $\quad$ $\frac{2}{1}$ ②

$x-2=0$

$m = \frac{14-6}{10} = \frac{8\div2}{10\div2} = \frac{4}{5}$ $\quad$ $x-\frac{4}{5}=0$

$5x-4=0$ $\quad$ $5x-4=0$

d. $15p^2-3p$

	$-3p$	0
-1		
$5p$	$15p^2$	0
	$3p$	0

$(5p-1)(3p$

$15p^2-3p$

correct!

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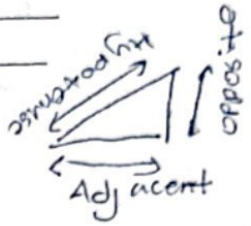
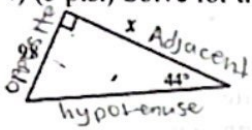
$\sin\theta = \frac{opp}{hyp}$ $\cos\theta = \frac{adj}{hyp}$ $\tan\theta = \frac{opp}{adj}$



4) (5 pts.) Solve for the missing side length. Show your work. Round lengths to the nearest tenth.



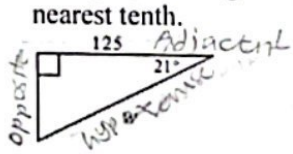
$X = 101.48$

$\tan(44°) = \frac{98}{x}$ $\frac{\tan(44°)}{1} \times \frac{98}{x}$

$x = \frac{98}{\tan(44°)}$

$\searrow 101.48$

5) (5 pts.) Use trigonometric ratios to solve for the variable. Show your work. Round lengths to the nearest tenth.



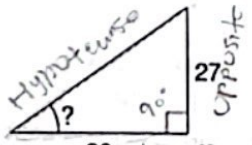
$W = 133.90$

$\cos(21°) = \frac{125}{w}$ $\frac{\cos(21°)}{1} = \frac{125}{w}$

$w = \frac{125}{\cos(21°)}$

$\searrow$

6) (3 pts.) Solve for the missing angle. Show your work.



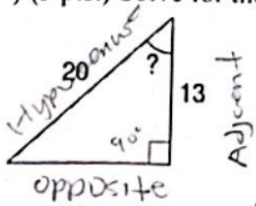
$? = 35.39°$

$\tan(?) = \frac{27}{38}$

$\tan(?) = \frac{27}{38}$

$? = \tan^{-1} \times \frac{27}{38} \rightarrow 35.39°$

7) (3 pts.) Solve for the missing angle. Show your work.



$? = 49.45°$

$\cos(?) = \frac{13}{20}$

$\cos(?) = \frac{13}{20}$

$? = \cos^{-1} \times \frac{13}{20} \rightarrow 49.45°$

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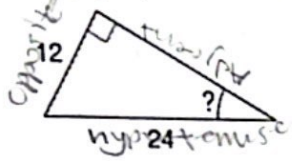
8) (3 pts.) Solve for the missing angle. Show your work.

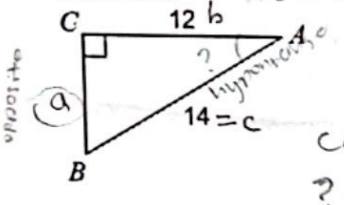


$\sin(?) = \frac{12}{24}$ $? = 30°$

$\sin(?) = \frac{12}{24}$

$? = \sin^{-1} \times \frac{12}{24} \rightarrow 30°$

9.) (6 pts.) Solve the triangle for all missing side lengths and angle measures. Show your work to receive full credit.



$\cos(?) = \frac{12}{14}$

$\cos(?) = 12$

$? = \cos^{-1} \times \frac{12}{14}$

$\angle A = 31°$

$\angle A =$ 31°

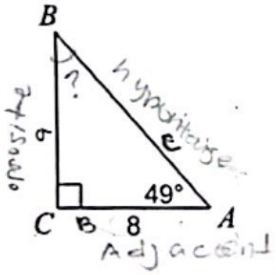
$\angle B =$ 59° $\angle B \rightarrow 180 - 90 - 31 = 59°$ $\angle B = 59°$

$a =$ 7.21 $a = \sqrt{c^2 - b^2}$

$a = \sqrt{14^2 - 12^2}$

$a = \sqrt{196 - 144} = 52 \rightarrow 7.21$

10) (6 pts) Solve the triangle for all missing side lengths and angle measures. Show your work to receive full credit.



$180 - 90 = 90$

$90 - 49 = 41°$

$\angle B =$ 41°

$a =$ 9.3

$c =$ 12.30

a)

$\cos(49°) = \frac{8}{c}$

$c = \frac{8}{\cos(49°)}$ ↓ c

$8 \div 0.65 = 12.30$

$a = \sqrt{c^2 - b^2}$

$a = \sqrt{12.3^2 - 8^2}$

$a = \sqrt{151.29 - 64} = \sqrt{87.29} = 9.3$

Another way

$\tan(49°) = \frac{a}{8}$

$a = \tan(49°) \times 8$

↓

9.2

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Bonus) (4 pts) Factor each of the expressions below, if possible. Show your work.

a. $169x^2 - 289$

17	$-221x$	-289
$13x$	$169x^2$	$221x$

$13x \quad 17$

$(13x+17)(13x-17)$

$169x^2 - 221x + 221x - 289$

$169x^2 - 289$

b. $x^2 + 10x + 25$

$x^2 + 10x + 25$

$a^2 + b + c$

$a = 1 \quad b = 10 \quad c = 25$

$x = \frac{-10 \pm \sqrt{10^2 - 4 \cdot 1 \cdot 25}}{2 \cdot 1}$

$x = \frac{-10 \pm \sqrt{100 - 100}}{2}$

$x = \frac{-10 \pm 0}{2}$

$\frac{-10 + 0}{2}$ or $\frac{-10 - 0}{2}$

$\frac{-10}{2} \div 2 = \frac{-5}{1}$ same as $\frac{-10}{2}$

$x + \frac{-5}{1} = 0$

$x + 5 = 0$

$(x+5)(x+5)$

$x^2 + 5x + 5x + 25$

$x^2 + 10x + 25$

c. $16x^2 - 8x + 1$

$16x^2 - 8x + 1$

$a^2 + b + c$

$a = 16 \quad b = -8 \quad c = 1$

$x = \frac{8 \pm \sqrt{8^2 - 4 \cdot 16 \cdot 1}}{2 \cdot 16}$

$x = \frac{8 \pm \sqrt{64 - 64}}{32}$

$x = \frac{8 \pm 0}{32}$

$\frac{8+0}{32}$ $\quad \frac{8 \div 4}{32 \div 4} = \frac{2 \div 2}{8 \div 2} = \frac{1}{4}$

$\frac{8-0}{32}$ $\quad \frac{8}{32}$ same

$x - \frac{1}{4} = 0$ (×4)

$4x - 1 = 0$

$(4x-1)(4x-1)$

$16x^2 - 4x - 4x + 1$

$16x^2 - 8x + 1$

d. $x^2 - \frac{1}{4}$

$1 \cdot x^2 - \frac{1}{4}$ (×4)

$4x^2 - 1$

-1	$-2x$	-1
$2x$	$4x^2$	$2x$

$2x \quad 1$

$(2x+1)(2x-1)$

$4x^2 + 2x - 2x - 1$

$4x^2 - 1$