

Name:

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M8H Ch2a Operations with Fractions 2025

1. When adding or subtracting two fractions, why do they need to have a common denominator first?

Explain: Because if you add two parts of the same whole, you get a correct answer.

2. When multiplying or dividing fractions, do you need to have a common denominator first? Why or why not? Explain?

no, because your denominators get multiplied.

e.g. $\frac{3}{4} \times \frac{2}{6} = \frac{1}{4}$

3. When dividing by a fraction, why do we flip the fraction and change the division operation to a multiplication operation? Explain:

$\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times 4 = 3$

4. When multiplying fractions, what does it mean to "Cancel Out" common factors? Explain:

you lower two numbers with a common factor, which gives you a smaller number.

e.g. $\frac{3}{4} \times \frac{2}{4} = \frac{3}{2} \times \frac{1}{4} = \frac{3}{8}$

5. When multiplying fractions, can you "cancel" out a common factor if both terms are in the numerator? Why or Why not? Explain.

no, because those two numbers get multiplied by each other and it doesn't get reduced in a fraction.

6. What does it mean to find the reciprocal? What is the reciprocal of $\frac{a}{b}$?

The reciprocal is the flip of a #
reciprocal of $\frac{a}{b} = \frac{b}{a}$

7. What happens when you take a number to the power of -1? Suppose you have a fraction to the power of -1, what would it become?

you would take the reciprocal.
e.g. $\frac{3}{4}^{-1} = \frac{4}{3} = \frac{1\frac{1}{3}}{1}$

8. Indicate the GCF between the numerator and denominator. Then reduce the fractions to lowest terms

a) $\frac{8}{12}$ $\frac{4}{3}$ $= \frac{2}{3}$	b) $\frac{15}{25}$ $\frac{5}{5}$ $= \frac{3}{5}$	c) $\frac{24}{36}$ $\frac{12}{12}$ $= \frac{2}{3}$	d) $\frac{36}{63}$ $\frac{9}{9}$ $= \frac{4}{7}$	e) $\frac{56}{49}$ $\frac{7}{7}$ $= \frac{8}{7} = 1\frac{1}{7}$	f) $\frac{48}{84}$ $\frac{12}{12}$ $= \frac{4}{7}$
g) $\frac{65}{117}$ $\frac{13}{13}$ $= \frac{5}{9}$	h) $\frac{150}{105}$ $\frac{15}{15}$ $= \frac{10}{7}$	i) $\frac{224}{36}$ $\frac{4}{4}$ $\frac{56}{9} = \frac{14}{9}$	j) $\frac{24}{96}$ $\frac{24}{24}$ $= \frac{1}{4}$	k) $\frac{81}{135}$ $\frac{27}{27}$ $= \frac{3}{5}$	l) $\frac{720}{1080}$ $\frac{360}{360}$ $= \frac{2}{3}$
m) $\frac{a^4 b^5}{a^4 b^3 b^2}$ $\frac{a}{b^2}$	n) $\frac{8!}{2^9}$ $\frac{40320}{512} = 78\frac{3}{4}$	o) $\frac{a^2 b^3 c}{a b^5 d^2 c}$ $\frac{a}{b^2 c}$	p) $\frac{3a+3b}{5a+5b}$ $\frac{3(a+b)}{5(a+b)} = \frac{3}{5}$	q) $\frac{a^2 - b^2}{2a + 2b}$ $\frac{(a-b)(a+b)}{2(a+b)} = \frac{a-b}{2}$	r) $\frac{a-b}{b-a}, [a \neq b]$ -1

9. Evaluate the following by adding or subtracting fractions

a) $\frac{5}{9} + \frac{40}{72}$ $\frac{40}{72} + \frac{40}{72} = \frac{80}{72} = 1\frac{1}{9}$	b) $\frac{3}{18} + \frac{25}{30} = \frac{1}{6} + \frac{26}{30}$ $= \frac{31}{30} = 1\frac{1}{30}$	c) $\frac{10}{21} + \frac{22}{28} = \frac{10}{21} + \frac{11}{14}$ $\frac{20}{42} + \frac{33}{42} = \frac{53}{42}$
d) $1\frac{2}{5} + 3\frac{2}{20}$ $4\frac{10}{20} = 4\frac{1}{2}$	e) $1\frac{5}{17} - \frac{38}{51}$ $1\frac{15}{51} - \frac{38}{51} = \frac{66}{51} - \frac{38}{51}$ $= \frac{28}{51}$	f) $\frac{34}{39} - \frac{55}{78}$ $= \frac{33}{78}$
g) $2\frac{1}{5} + 3\frac{2}{4} - 2\frac{7}{3}$ $= 2\frac{12}{60} + 3\frac{30}{60} - 2\frac{140}{60}$ $= 5\frac{42}{60} - 4\frac{20}{60}$ $= 1\frac{22}{60} = 1\frac{11}{30}$	h) $-3\frac{1}{4} + 3\frac{2}{3} + 1\frac{1}{2}$ $= -3\frac{3}{12} + 3\frac{8}{12} + 1\frac{6}{12}$ $= \frac{5}{12} + 1\frac{6}{12}$ $= 1\frac{11}{12}$	i) $4\frac{7}{8} - 2\frac{9}{10} - 2\frac{13}{20}$ $= 4\frac{35}{40} - 2\frac{36}{40} - 2\frac{26}{40}$ $= 3\frac{75}{40} - 2\frac{36}{40} - 2\frac{26}{40}$ $= 1\frac{39}{40} - 2\frac{26}{40}$ $= 1\frac{39}{40} - 1\frac{66}{40} = -\frac{27}{40}$
j) $\frac{152}{14} \times \frac{213}{36} - \frac{2}{3}$ $\frac{65}{24} - \frac{2}{3} = \frac{49}{24} = 2\frac{1}{24}$	k) $\frac{35}{36} \div \frac{49}{48} - \frac{2}{7}$ $\frac{35}{36} \times \frac{48}{49} - \frac{2}{7}$ $= \frac{20}{21} - \frac{2}{7} = \frac{14}{21} = \frac{2}{3}$	l) $\frac{1}{3} - 2\frac{2}{3} \times 5\frac{1}{4}$ $\frac{1}{3} - \frac{8}{3} \times \frac{21}{4}$ $= \frac{1}{3} - 14 =$
m) $\frac{5}{2} \times \frac{42}{15} + \frac{1}{2}$ $= \frac{2}{3} + \frac{1}{2} = \frac{7}{6} = 1\frac{1}{6}$	n) $\frac{2}{3} + \frac{6}{7} \div \frac{18}{14} - \frac{1}{2}$ $\frac{2}{3} + \frac{6}{7} \times \frac{14}{18} - \frac{1}{2}$ $\frac{2}{3} + \frac{2}{3} - \frac{1}{2} = \frac{4}{6} + \frac{4}{6} - \frac{3}{6}$ $= \frac{5}{6}$	o) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} = \frac{37}{60}$ $= 1\frac{9}{20}$

10. Evaluate the following by Multiply or Divide the following.

a) $\frac{124}{18} \times \frac{273}{15} = 1\frac{2}{10} = 1\frac{1}{5}$	b) $\frac{255}{24} \times \frac{162}{15} = \frac{10}{9} = 1\frac{1}{9}$	c) $\frac{10}{12} \div \frac{1}{3} = \frac{10}{4} = 2\frac{1}{2}$
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d) $\frac{6}{7} \div \frac{3}{4} = \frac{6}{7} \times \frac{4}{3} = 1\frac{1}{7}$	e) $4\frac{2}{3} \div 1\frac{2}{7} = \frac{14}{3} \times \frac{7}{9} = \frac{98}{27}$	f) $\frac{16}{21} \div \frac{24}{35} = \frac{16}{21} \times \frac{35}{24} = \frac{10}{9} = 1\frac{1}{9}$
g) $6\frac{3}{4} \div \frac{3}{16} = \frac{27}{4} \times \frac{16}{3} = 36$	h) $3\frac{1}{5} \times 6\frac{1}{4} \div 13\frac{1}{3} = \frac{16}{5} \times \frac{25}{4} \times \frac{3}{40} = 1\frac{1}{2}$	i) $\frac{26}{24} \times \frac{12}{14} \times \frac{56}{65} = \frac{52}{65}$
j) $\frac{255}{21} \times \frac{54}{41} \times \frac{28}{15} \times \frac{22}{18} = \frac{40}{3} = 13\frac{1}{3}$	k) $\frac{14}{27} \times \frac{182}{40} \times \frac{36}{15} \times \frac{32}{21} = \frac{64}{75}$	l) $\frac{16}{21} \times \frac{30}{24} \times \frac{27}{18} \div \frac{9}{14} = \frac{20}{9} = 2\frac{2}{9}$
m) $\frac{64}{9} \times \frac{27}{32} \times \frac{24}{45} \div \frac{48}{18} = \frac{6}{5} = 1\frac{1}{5}$	n) $\frac{4}{16} \times \frac{22}{12} \times \frac{27}{25} \times \frac{15}{18} = \frac{6}{5} = 1\frac{1}{5}$	o) $\frac{1}{5} \div \frac{4}{27} \div \frac{16}{21} = \frac{1}{5} \times \frac{27}{4} \times \frac{21}{16} = \frac{189}{64}$
$1\frac{2}{3} \div 2\frac{3}{6} \div 6\frac{1}{4} = \frac{5}{3} \times \frac{4}{15} \times \frac{4}{25} = \frac{8}{75}$	$\frac{2}{3} \div 2\frac{3}{4} \div 7\frac{1}{3} = \frac{2}{3} \times \frac{4}{11} \times \frac{3}{22} = \frac{4}{121}$	$7\frac{3}{4} \div 5\frac{1}{3} \div 1\frac{1}{2} = \frac{31}{4} \times \frac{3}{16} \times \frac{2}{3} = \frac{31}{32}$

11. Simplify each of the following composite fractions. Reduce your answer to lowest form

a) $\frac{\frac{2}{3} + \frac{3}{4}}{\frac{3}{4} - \frac{1}{6}} = \frac{\frac{17}{12}}{\frac{19}{30}} = \frac{17}{12} \times \frac{30}{19} = \frac{85}{38} = 2\frac{9}{38}$	b) $\frac{\frac{7}{8} + \frac{3}{5}}{\frac{1}{2} - \frac{3}{6}}$ undefined $\frac{59}{40} \div 0$	c) $\frac{\frac{3}{4} \times \frac{1}{2} - \frac{2}{7}}{\frac{5}{3} + \frac{1}{2}} = \frac{\frac{3}{8} - \frac{2}{7}}{\frac{13}{6}} = \frac{\frac{15}{56}}{\frac{13}{6}} = \frac{15}{56} \times \frac{6}{13} = \frac{15}{328}$
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$d) \frac{2 \times \frac{1}{5} - \frac{1}{10}}{\frac{1}{5} + \frac{5}{2}} = \frac{7}{10}$ $\frac{7}{10} \times \frac{10}{27} = \frac{7}{27}$	$e) \frac{\left(2\frac{1}{2} + 3\frac{3}{4}\right) \times \frac{8}{50}}{\frac{2}{5}}$ $= \frac{5\frac{5}{4} \times \frac{8}{50}}{\frac{2}{5}}$ $= \frac{25 \times \frac{8}{50}}{\frac{2}{5}} = \frac{1}{2} = \frac{2}{5}$	$f) \frac{\frac{1}{2} + \left(\frac{3}{4} \div \frac{1}{2}\right)}{\left(\frac{1}{6} + \frac{2}{3}\right) \div \frac{3}{5}} = \frac{1}{2} + \left(\frac{3}{4} \times \frac{2}{1}\right)$ $= \frac{2}{\frac{25}{18}} = 2 \times \frac{18}{25}$ $= \frac{36}{25} = 1\frac{11}{25}$
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12. Simplify each of the fractions to the given exponent. Reduce your answer to lowest form

$a) \left(\frac{2}{3}\right)^{-1} = \frac{3}{2} = \boxed{\frac{3}{2}}$	$b) \left(\frac{4}{5}\right)^{-1} \frac{5}{4} = \boxed{\frac{5}{4}}$	$c) \left(\frac{5}{4}\right)^{-2} \frac{4}{5}^2 = \boxed{\frac{16}{25}}$
$d) \left(\frac{a^2}{b^3}\right)^{-1} = \boxed{\frac{b^3}{a^2}}$	$e) \left(\frac{a^2 c^3}{b^2 d}\right)^{-2} \left(\frac{b^2 d}{a^2 c^3}\right)^2 = \boxed{\frac{b^4 d^2}{a^4 c^5}}$	$f) \frac{2}{4} \times \frac{7}{4} = \boxed{\frac{7}{2}}$
$g) \frac{1}{\frac{1}{\frac{1}{\left(\frac{a}{b}\right)}}} = \boxed{\frac{b}{a}}$	$h) \left(\frac{1}{\frac{1}{\frac{1}{\frac{a}{b}}}}\right)^{-2} = \boxed{\frac{a^2}{b^2}}$	$\frac{2}{\frac{4}{7} + \frac{1}{\frac{2}{3} + \frac{1}{2}}} = \frac{2}{\frac{4}{7} + \frac{6}{7}} = \frac{2}{\frac{10}{7}} = 1\frac{2}{5}$

Part 2 Applications of Fractions: For each of the following questions below, write out the mathematical operations required to solve the problem. Then solve the problem.

13. Albert spent $\frac{1}{5}$ of his savings on a new computer. Later that week, he spent $\frac{1}{2}$ of the rest on another desktop computer. What fraction of his original savings did he have left?

$$\frac{5}{5} - \frac{1}{5} = \frac{4}{5} \quad \frac{4}{5} \times \frac{1}{2} = \frac{2}{5}$$

~~Albert has 3/5 of his savings left.~~

14. Jenny has a purse of coins. $\frac{3}{7}$ of the coins are pennies. $\frac{1}{8}$ of the other coins are quarters. If there are 15 quarters, how many coins pennies does she have?

let x be the total # of coins

$$x - \frac{3}{7}x = \frac{4}{7}x \quad \frac{1}{8} \times \frac{4}{7}x = 15$$

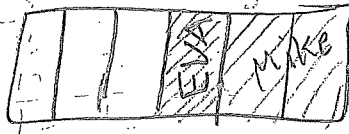
$$\frac{3}{7} \times 210 = 90$$

$$\frac{4}{56}x = 15 \quad \frac{1}{14}x = 15 \quad x = 15 \times 14$$

$$x = 210$$

Jenny has 210 Total coins and 90 pennies

15. Shirley bought a bunch of donuts and left it in the common room. Mike arrives and eats $\frac{1}{3}$ of all the donuts. Then Eva arrives and eats $\frac{1}{4}$ of what remained. If there was 3 donuts left, how many donuts did Shirley buy?



$$\frac{3}{6} = 3$$

$$\frac{6}{6} = 2$$

$$\frac{x}{2} = 3$$

$$2x = 6$$

Let x be the Total # of donuts

Shirley bought 6 donuts

16. Rick has a string 60 meters. He cuts the string into pieces that are $\frac{2}{3}$ of a meter long. How many pieces will he have?

$$60 \times \frac{3}{2} = 90$$

90 pieces

17. Sally and her friends bought three pizzas, with eight slices each. One of the boys ate 3 slices and went home. They now need to split the rest of the pizza amongst six people. What fraction of a pizza does each person get?

$$24 - 3 = 21 \times \frac{1}{6} = \frac{21}{6} = 3 \frac{3}{6} = 3 \frac{1}{2}$$

3 and a half

18. Michael has a piece of tape $7\frac{4}{5}$ units long. If he cuts it into pieces each $\frac{3}{5}$ of a unit long, how many pieces will he have?

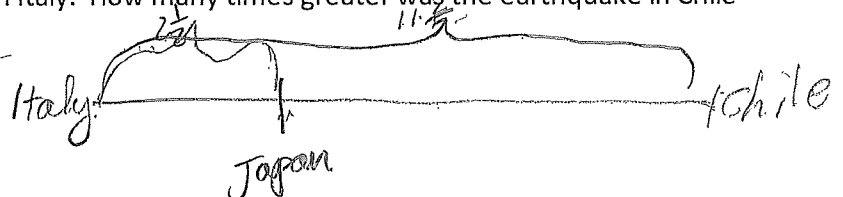
$$\frac{39}{5} \times \frac{5}{3} = 13$$

19. A cookie recipe requires $1\frac{2}{3}$ cups of flour to make 10 cookies. If Sarah has 18 cups of flour, how many cookies can she make? (108 cookies)

$$\frac{5}{3} \times 10 = 18 \times \frac{3}{5} = \frac{54}{5} = 10.8$$

20. An earthquake in Japan was $2\frac{1}{2}$ times greater than the earthquake in Italy. Another earthquake in Chile was $11\frac{2}{3}$ greater than the earthquake in Italy. How many times greater was the earthquake in Chile compared to Japan?

$$11\frac{2}{3} - 2\frac{1}{2} = 9\frac{1}{6}$$



21. A song on your iPhone is $3\frac{3}{4}$ minutes long. If you have $9\frac{2}{3}$ minutes, how many times can you listen to the song?

$$\frac{29}{3} \times \frac{4}{15} = \frac{116}{45} = 2\frac{26}{45}$$

22. Jason needs $2\frac{1}{2}$ tanks of gas to drive from Vancouver to Portland. Each tank of gas will cost him $\$ \frac{98}{3}$.

How much will it cost him to drive from Vancouver to Portland?

$$2 \times \frac{98}{3} + \frac{98}{3} \times \frac{1}{2} = \frac{196}{3} + \frac{49}{3} = \frac{245}{3} = 81\frac{2}{3}$$

23. The length of a box is increased by $1\frac{2}{3}$ times its original length and the width is increased by $2\frac{1}{5}$ times its original width. If the original area of the box is 300m^2 , then what is the area of the new box?

$$(L \times \frac{5}{3})(W \times \frac{11}{5})$$

$$\frac{11}{3}LW$$

24. Challenge: Sharon has some money in her pocket. Her friend Wendy has $1\frac{1}{2}$ times as much as Sharon.

Another friend Chelsea has $1\frac{2}{3}$ times as much money as Wendy. Altogether they have \$200. How much money does Sharon have?

$$\text{\$48}$$

$$x + \frac{3}{2}x + (\frac{3}{2}x \times \frac{5}{3}) = 200$$

$$\frac{5}{2}x + (\frac{3}{2}x \times \frac{5}{3}) = 200$$

$$\frac{5}{2}x + \frac{5}{2}x = 200$$

$$5x = 200$$

$$x = 40$$

25. Larry watched one television program for $\frac{1}{3}$ of an hour and then watched another program for 15 min.

For what fraction of an hour did Larry watch television?

$$\frac{1}{4} + \frac{1}{3} = \frac{7}{12} = 35 \text{ min}$$

26. Keon baked a wild blueberry upside-down cobbler. Shawnie ate $\frac{1}{6}$ of the cobbler. Iris ate $\frac{1}{5}$ of what was left. Chan ate $\frac{1}{4}$ of what was left after that. Cami ate $\frac{1}{3}$ of what was left after that. Demi ate $\frac{1}{2}$ of what was left after that. How much of the original cobbler remained?

$$\frac{1}{6}$$

27. Challenge: Amy, Betty, and Graham ran for Student Council president. Amy won with $\frac{9}{20}$ of the votes,

Betty got $\frac{2}{5}$, and Graham got $\frac{3}{20}$. If 20 people had switched their vote from Graham to Betty, then

Betty would have ended up with 1 more vote than Amy. How many people voted?

Amy	Betty	Graham
$\frac{9x}{20}$	$\frac{8x}{20}$	$\frac{3x}{20}$
$\frac{9x}{20}$	$\frac{8x}{20} + 20$	$\frac{3x}{20} - 20$

$$\frac{8}{20}x + 20 = \frac{9}{20}x + 1$$

$$-\frac{1}{20}x = -19$$

$$x = 19 \times 20$$

$$x = 380$$

let x be the # of people who voted

380 people voted

Name: Kiavash BehravaneshDate: Oct. 22, 2025Math 8H HW CH2 Lesson 2 Solving Equations with Simple Operations

1. Solve the following equations for "x". If the answer is a fraction, simplify to lowest terms.

a) $3x - 5 = 13$ $3x = 18$ $x = 6$	b) $\frac{5n}{6} = 12$ $5n = 72$ $n = \frac{72}{5}$	c) $8 + 5x = 12$ $5x = 4$ $x = \frac{4}{5}$
d) $-6x + 4 = -8$ $-6x = -12$ $x = 2$	e) $12 = \frac{-4x}{3} + 2$ $\frac{4x}{3} = -10$ $4x = -30$ $x = -\frac{15}{2}$	f) $13 = -3x - 2$ $3x = -15$ $x = -5$
g) $\frac{2x}{5} - 4 = 12$ $2x = 90$ $x = 45$	h) $\frac{3}{x} = \frac{1}{12}$ $\frac{1}{12}x = 3$ $x = 36$	i) $9x - 0.5 = 3x$ $9x - \frac{1}{2} = 3x$ $6x = \frac{1}{2}$ $x = \frac{1}{12}$
j) $\frac{30x}{4} = \frac{20}{7}$ $30x = \frac{20}{7} \times 4$ $30x = \frac{80}{7}$ $x = \frac{80}{7} \times \frac{1}{30}$ $x = \frac{8}{21}$	k) $x + (x+1) + (x+2) = -75$ $x + x + 1 + x + 2 = -75$ $3x = -78$ $x = -26$	l) $3 - \frac{2}{x} = 5$ $-\frac{2}{x} = 2$ $-2 = 2x$ $x = -1$
m) $\frac{3x}{8} = x + 1$ $3x = 8x + 8$ $-5x = 8$ $x = -\frac{8}{5}$	n) $4x + 12 = 8x - 5$ $-4x = -17$ $x = \frac{17}{4}$	o) $4x + 2 - 9x = 8 + 7x - 4$ $-12x = 2$ $x = -\frac{1}{6}$

p) $x + (x+1) + (x+2) = -75$ $x + x + 1 + x + 2 = -75$ $3x = -26$ $x = -\frac{26}{3}$	Q) $11x - 4(2x-3) = 24$ $11x - 8x + 12 = 24$ $3x = 12$ $x = 4$	R) $3(4x-8) = 3x+1$ $12x - 24 = 3x + 1$ $9x = 25$ $x = \frac{25}{9}$
s) $2(x+3) = 3(x-5)$ $2x + 6 = 3x - 15$ $-x = -21$ $x = 21$	t) $9x - 8 + 12x = 14 - 12x + 3$ $33x = 25$ $x = \frac{25}{33}$	u) $1.4(x-5) = 2.8(3x+5)$ $\frac{7}{5}x - 7 = \frac{42}{5}x + 14$ $35x - 35 = 42x + 70$ $-7x = 105$ $x = -15$
v) $(11x+7) - (7x-3) + (6x+1) = 56$ $11x + 7 - 7x + 3 + 6x + 1 = 56$ $10x = 56 - 11$ $10x = 45$ $x = \frac{9}{2}$	w) $\frac{1}{2}\left(\frac{1}{3} - \frac{1}{x}\right) = \frac{1}{4}$ $-\frac{1}{6} - \frac{1}{2x} = \frac{1}{4}$ $-\frac{1}{2x} = \frac{1}{4} - \frac{1}{6}$ $-\frac{1}{2x} = \frac{1}{12}$ $x = -6$	x) $3x - (1-x) = 5$ $3x - 1 + x = 5$ $4x = 6$ $x = \frac{3}{2}$
y) $7x - (1-x) - (4-x) = 5$ $7x - 1 + x - 4 + x = 5$ $9x = 10$ $x = \frac{10}{9}$	z) $(11x+7) - (7x-3) + (6x+1) = 56$ $11x + 7 - 7x + 3 + 6x + 1 = 56$ $10x = 56 - 11$ $10x = 45$ $x = \frac{9}{2}$	zz) $12x - (6-9x) = 9x + (-8)$ $12x - 6 + 9x = 9x - 8$ $12x = -8 + 6$ $12x = -2$ $x = -\frac{1}{6}$

2. Tim and his friend Sara together have \$38. Tim has \$4 more than Sara. Write an equation to represent how much money they have together. Indicate what your variable is.

$\frac{38}{2} + 2 = 21$ $17 + 2 = 19$ $34 + 4 = 38$ $x + (x + 4) = 38$ $\text{Sara} = x$ $\text{Sara} = 17$
 $2x + 4 = 38$ $2x = 38 - 4$ $2x = 34$ $x = 17$ $x = 17$ $17 + 4 = 21$
 $2x = 38 - 4$ $x = 17$ $x = 17$

3. Tom is 7 years older than his friend Jason. Together, they are 57 years old. Write an equation to represent how old they are together. Indicate what your variable is.

$x + (x + 7) = 57$ $\text{Jason} = x$
 $2x = 57 - 7$ $\text{Jason} = 25 \text{ years}$
 $2x = 50$ $\text{Tom} = 32 \text{ years}$
 $x = 25$

4. There are 50 cupcakes in the staff room. Mr. CHEONG ate some of the cupcakes and Mr. Young ate twice as much as Mr. Cheong. Afterwards, there are 11 cupcakes left. Write an equation for how many cupcakes there are. What is your variable?

$x = \text{Mr. Cheong ate}$

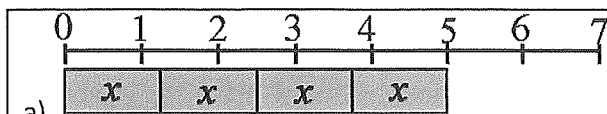
$$50 - x - 2x = 11$$

$$-3x = -39$$

$$x = 13$$

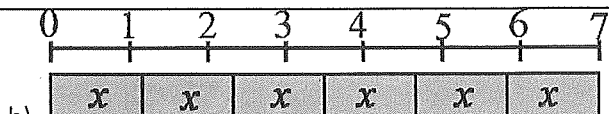
$$x = 13$$

5. Given each diagram, find the length of each bar:



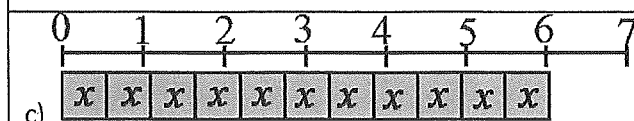
$$4x = 5$$

$$x = \frac{5}{4}$$



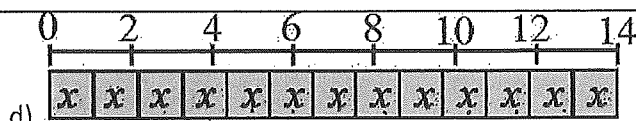
$$6x = 7$$

$$x = \frac{7}{6}$$



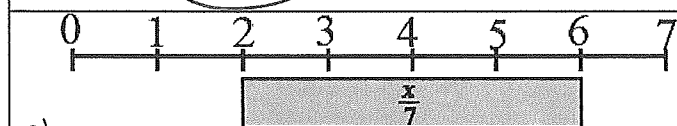
$$11x = 6$$

$$x = \frac{6}{11}$$



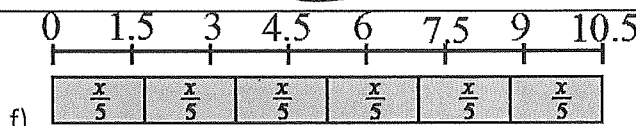
$$13x = 14$$

$$x = \frac{14}{13}$$



$$\frac{x}{7} = 4$$

$$x = 28$$



$$6 \times \frac{x}{5} = 10.5$$

$$\frac{6}{5}x = 10.5$$

$$x = \frac{2.1 \times 5}{6}$$

$$x = \frac{10.5}{12}$$

6. Two positive integers are in the ratio of 8 to 13. If the difference between them is 35, find the larger integer.

7. The lengths of five of six line segments are $3x+1$, $2-2x$, $5x-1$, $4x-3$, and $3x+2$. Find the lengths of the sixth segment in terms of "x" if the mean of all six segments is $3x-2$

Let y be line segment #6

$$\frac{3x+1+2-2x+5x-1+4x-3+3x+2+y}{6} = 3x-2$$

$$\frac{13x+1+y}{6} = 3x-2$$

$$78x+6+y = 18x-12$$

$$6y = -60x-18$$

$$y = -10x-3$$

The last line segment is $-10x-3$

8. In the equation below, a student solves the equation by subtracting 5 from both sides. Is this step correct?

Explain: $3x - 5 = 12$ *no, he should have moved the (-5) to the right side of the $=$ sign which makes it $12 + 5$ instead of $12 - 5$, then he would have*
 $3x = 17$

9. Tim solves the equations below with the work shown. Explain if there are any errors:

s1: $6x + 12 = 24$

s2: $6x + 12 = 24$

★ s1: $\frac{6x}{12} = \frac{24}{12}$ *← you can not reduce a # of you don't reduce all of them*

s3: $6x + 1 = 2$

s4: $6x = 1$

s5: $x = \frac{1}{6}$

s1: $\frac{5x}{3} + 1 = 9$ *← $+1$ becomes (-1)*

s2: $\frac{5x}{3} = 10$ *←*

s3: $3 \times \frac{5x}{3} = 10 \times 3$ *← they cancel*

s4: $\frac{15x}{9} = 30$ *← you don't multiply the denominator*

s5: $x = 30 \times \frac{9}{15}$ *← don't even know what happened here*

s6: $x = 18$

s1: $6x = 7$

s2: $6 \times (6x) = 7 \times 6$ *← no need to multiply*

s3: $36x = 42$ *← $\times$ becomes $\div$ not $-$*

s4: $x = 42 - 36$

s5: $x = 6$

10. Given that $n!$ means the product of all natural numbers from "n" to 1, simplify the following:

$5! \left(\frac{1}{2!} - \frac{1}{3!} - \frac{1}{5!} \right)$

$120 \left(\frac{39}{120} \right)$

$120 \left(\frac{1}{2} - \frac{1}{6} - \frac{1}{120} \right)$

$\boxed{39}$

$120 \left(\frac{60}{120} - \frac{20}{120} - \frac{1}{120} \right)$

11. If $x + y = 12$ and $x - y = 8$, what is the value of $2x - xy$?

$x + y = 12$

$x - y = 8$

$2x = 20$

$x = 10$

$10 - y = 8$

$y = 2$

$x = 10$
 $y = 2$

$2 \times 10 - 10 \times 2 = 20 - 20 = 0$

Name: Kiavash BehravaneshDate: NOV. 5, 2025**Math 8H HW Ch2 Lesson 3 Solving Equations with Fractions and Distributive Property**

1. Distribute the term in front of the brackets to each term inside the brackets. Multiply and simplify:

a) $5(2x+4)$ $10x + 20$	b) $12(3x^2+8)$ $36x^2 + 96$	c) $12(x-4)+3(4x-5)$ $12x - 48 + 12x - 15$ $24x - 63$
d) $-3(2x^2-15x+11)$ $-6x^2 + 45x - 33$	e) $\frac{3}{4}(20x-12)$ $15x - 9$	f) $\frac{2}{3}(24x^2-18x+27)$ $16x^2 - 12x + 18$

2. Indicate LCD and then multiply all terms by the LCD. Simplify the equation and then solve:

a) $\frac{x}{5} + \frac{2}{3} = \frac{x}{3}$ LCD = 15 $3x + 10 = 5x$ $-2x = -10$ $x = 5$	b) $\frac{x}{2} - \frac{1}{3} = \frac{2}{4}$ LCD = 12 $6x - 4 = 6$ $6x = 10$ $x = \frac{5}{3}$
c) $\frac{2x}{3} = \frac{x}{2} + 3$ LCD = 6 $4x - 3x = 18$ $x = 18$	d) $\frac{2x}{3} + \frac{4x}{5} - 2 = \frac{5x}{3} + 3$ LCD = 15 $10x + 12x - 30 = 25x + 45$ $-3x = 75$ $x = -25$

3. Solve the following equations for "x"

a) $x - \frac{1}{2} = -\frac{13}{2}$

$2x - 1 = -13$

$2x = -12$

$x = -6$

b) $-4\frac{1}{3} = x + \left(-\frac{1}{3}\right)$

$-4\frac{1}{3} = x - \frac{1}{3}$

$-13 - 3x = -1$

$-3x = 12$

$x = -4$

$$c) -(-4.25) + x = 3$$

$$\frac{17}{4} + x = 3$$

$$68 + 4x = 12 \quad | \quad \times$$

$$4x = -56$$

$$x = -14$$

$$e) -\frac{7}{4}x + \frac{1}{2} = -\frac{9}{10}$$

$$-35x + 10 = -18$$

$$-35x = -28$$

$$x = \frac{4}{5}$$

$$g) -18 = \frac{-2}{5}(15x - 45)$$

$$-90 = -30x + 90$$

$$30x = 180$$

$$x = 6$$

$$i) 5 = \frac{3}{4}(3x + 2) - 2x$$

$$20 = 9x + 6 - 8x$$

$$-x = -14$$

$$x = 14$$

$$i) 4(x + 6) + 2(5 - x) - 2[3 - (\frac{x}{2} - 2)] = 4$$

$$4x + 24 + 10 - 2x - 2(3 - \frac{x}{2} + 2) = 4$$

$$4x + 24 + 10 - 2x - 6 + 2x - 4 = 4$$

$$4x = 4 - 24$$

$$4x = -20$$

$$x = -5$$

$$d) \frac{1}{6}x - 1 = \frac{2}{3}$$

$$x - 6 = 4$$

$$x = 10$$

$$f) -27 = 6\left(x + \frac{1}{2}\right)$$

$$-6x = 3 + 27$$

$$x = -5$$

$$h) \frac{-5(2 - x)}{3} = 90$$

$$\frac{-10 + 5x}{3} = 90$$

$$-30 + 5x = 270$$

$$5x = 300$$

$$x = 60$$

$$j) 10\left(\frac{1}{2}x - 2\right) - \frac{2}{5}(30 - 5x) = -11$$

$$5x - 20 - 12 + 2x = -11$$

$$7x = 21$$

$$x = 3$$

$$k) 7x - 6 = x - 5 + 4x$$

$$2x = 1$$

$$x = \frac{1}{2}$$

$$l) 20 - 4x + 3 = 5x - 8 + 2x$$

$$-11x = -31$$

$$x = \frac{31}{11}$$

$$n) 18 - (2x - 5) - 2(x + 2) = 3x + 5$$

$$18 - 2x + 5 - 2x - 4 = 3x + 5$$

$$-7x = -14$$

$$x = 2$$

$$p) \frac{1}{6}(12x - 42) = -\frac{3}{4}(4 - 16x)$$

$$2x - 7 = -3 + 12x$$

$$-10x = 4$$

$$x = -\frac{2}{5}$$

$$r) \frac{2(5x - 1)}{3} = 3x + 1$$

$$\frac{10x - 2}{3} = 3x + 1$$

$$10x - 2 = 9x + 3$$

$$x = 5$$

$$t) \frac{6(3 - 2x)}{5} = x + 4$$

$$\frac{18 - 12x}{5} = x + 4$$

$$18 - 12x = 5x + 20$$

$$-17x = 2$$

$$x = -\frac{2}{17}$$

$$m) 3(x + 6) + 2x - 6 = 8x - 2(2x - 4)$$

$$3x + 18 + 2x - 6 = 8x - 4x + 8$$

$$x = -4$$

$$o) \frac{1}{3}(3 + 9x) = \frac{7}{4}(28 - 12x)$$

$$1 + 3x = 49 - 21x$$

$$24x = 48$$

$$x = 2$$

$$q) 24 + \frac{1}{6}x = \frac{1}{3}x$$

$$144 + x = 2x$$

$$-x = -144$$

$$x = 144$$

$$s) \frac{1}{2}x - 6 = \frac{3x}{10} + \frac{x}{8}$$

$$26x - 240 = 12x + 5x$$

$$19x = 240$$

$$x = \frac{240}{19}$$

$$u) x + 4 = 4[2(8x - 7) + 5x] - 3x$$

$$x + 4 = 4(16x - 14 + 5x) - 3x$$

$$x + 4 = 64x - 56 + 20x - 3x$$

$$-80x = -60$$

$$x = \frac{3}{4}$$

4. Challenge: Solve the following

a) $8 + \frac{2}{5}(3x-1) = -2 + \frac{1}{2}(20-3x)$

$$80 + 12x - 4 = -2 + 100 - 15x$$

$$12x + 15x = -2 + 4 - 80 + 100$$

$$27x = 22$$

$$x = \frac{22}{27}$$

b) $-0.4(0.5x-0.4) = 1.3-0.6(0.3-0.2x)$

$$-\frac{2}{5}\left(\frac{1}{2}x - \frac{2}{5}\right) = \frac{13}{10} - \frac{3}{5}\left(\frac{3}{10} - \frac{1}{5}x\right)$$

$$-\frac{1}{5}x + \frac{4}{25} = \frac{13}{10} - \frac{9}{50} + \frac{3}{25}x$$

$$-10x + 8 = 65 - 9 + 6x$$

$$-16x = 48$$

$$x = -3$$

c) $2x-3(4x-6) = 10-3[4(2x-5)+4x]$

$$2x - 12x + 18 = 10 - 3(8x - 20 + 4x)$$

$$2x - 12x + 18 = 10 - 24x + 60 - 12x$$

$$2x - 12x + 24x + 12x = 10 + 60 - 18$$

$$26x = 52$$

$$x = 2$$

d) $7x+2(3x-5) = 6[5+2(2x-5+2x)]$

$$7x + 6x - 10 = 6(5 + 4x - 10 + 4x)$$

$$7x + 6x - 10 = 30 + 24x - 60 + 24x$$

$$7x + 6x - 24x - 24x = 30 - 6 + 10$$

$$-35x = 24$$

$$x = -\frac{24}{35}$$

e) $8+2[3x-2(x-8x+5)] = 3(7x+3)-3x$

$$8 + 2(3x - 2x + 16x - 10) = 21x + 9 - 3x$$

$$8 + 6x - 4x + 32x - 20 = 21x + 9 - 3x$$

$$6x - 4x + 32x - 21x + 3x = 9 - 8 + 20$$

$$16x = 21$$

$$x = \frac{21}{16}$$

f) $2-[3x+2(20x-4+24x+1)] = 6(2x-3)-3x$

$$2 - (3x + 40x - 8 + 48x + 2) = 12x - 18 - 3x$$

$$2 - 3x - 40x + 8 - 48x - 2 = 12x - 18 - 3x$$

$$-3x - 40x - 48x - 12x + 3x = -18 - 2$$

$$-100x = -26$$

$$x = \frac{13}{50}$$

ame: Kiavash Behravesk

Date: NOV. 6, 2025

M8H HW CH2 Lesson 4: Using Equations to Model Problems

Write an equation for each of the questions below, indicate what your variables are and then solve:

1. Six times a number increased by 7 is 103. Find the number

$$x = 103 - 7$$

$$x = 96$$

2. Two consecutive numbers have a sum of 47. Find the two numbers

$$x + (x+1) = 47$$

$$2x = 46$$

$$x = 23$$

$$23$$

3. When 13 is subtracted from three-eighths of a number, the result is 11. Find the numbers.

$$\frac{3}{8}x - 13 = 11$$

$$\frac{3}{8}x = 24$$

$$x = 24 \div 3 = 12$$

$$x = 12$$

4. Bruce is 10 years older than Cindy. The sum of their ages is 52. How old is each person?

$$x + (x+10) = 52$$

$$2x = 42$$

$$x = 21$$

$$x = \text{cindy}$$

cindy is 21 and Bruce 31

5. For two consecutive numbers, the sum of the smaller and twice the larger is 38. Find the two numbers.

$$x + 2(x+1) = 38$$

$$3x = 36$$

$$x = 12$$

$$x = \#1 \quad x+1 = \#2$$

$$12, 13$$

6. Three consecutive numbers have a sum of 159. Find the numbers.

$$x + (x+1) + (x+2) = 159$$

$$x + x + 1 + x + 2 = 159$$

$$3x = 156$$

$$x = 52$$

$$49, 50, 51$$

7. Three consecutive even numbers have a sum of 672. Find the three numbers.

$$x + (x+1) + (x+2) = 672$$

$$3x = 669$$

$$x = 223$$

$$x = \text{smallest \#}$$

$$223, 224, 225$$

8. Mike ran twice as far as Brad. They ran a total of 18km. How far did each person run?

$$x + 2x = 18$$

$$3x = 18$$

$$x = 6$$

$$\text{Brad} = 6 \text{ km}$$

$$\text{Mike} = 12 \text{ km}$$

9. The difference of two numbers is 96. One number is nine times the other. What are the two numbers?

$$9x - x = 96$$

$$8x = 96$$

$$x = 12$$

$$x = \text{small \#}$$

$$12, 108$$

10. The sum of two numbers is 36. Four times the smaller is 1 less than the larger. What are the two numbers?

$$x + y = 36$$

$$x = \text{small \#}$$

$$x = 7$$

$$4x - y = -1$$

$$y = \text{larger \#}$$

$$y = 29$$

$$36 \div 7 = 24$$

$$5x = 35$$

$$x = 7$$

11. Tom has equal number of nickels, dimes, and quarters. Their total value is \$2.00. How many of each kind of coin does she have?

$$5x + 10x + 25x = 200$$

$$40x = 200$$

$$x = 5$$

$x = \# \text{ of coins}$

He has 5 nickles, Dimes, and quarters

Coin	#	value
nickle	x	5
Dime	x	10
quant	x	25

12. A collection of nickels and dimes has a total value of \$8.50. How many coins are there if there are 3-times as many nickels as dimes?

$$5x + 10y = 850$$

$$x = \frac{1}{3}y$$

$$3x = y$$

$$30x - 10y = 0$$

$$5x + 10y = 850$$

$$35x = 850$$

$$x = 24$$

$$x = \# \text{ of } n$$

$$y = \# \text{ of } d$$

24 nickles
8 dimes

13. James has 91 coins which are nickels, dimes, and quarters. There are twice as many quarters as dimes, and half as many nickels as dimes. How much money does James have?

$$x + y + z = 91$$

$$z = 2y$$

$$2z = y$$

$$x + y + z = 91$$

$$x + y + 2y = 91$$

$$x + 3y = 91$$

$$2x - y = 0$$

$$2x - y = 0$$

$$x + 3y = 91$$

$$6x - 3y = 0$$

$$7x = 91$$

$$x = 13$$

$$y = \frac{198}{7}$$

$x = \text{nickles}$
 $y = \text{Dimes}$
 $z = \text{quarters}$

$$x = \frac{99}{7}$$

$$z = \frac{396}{7}$$

14. Mike is four times as old as Ivy. The sum of their ages is 55 years. How old are they?

$$x + 4x = 55$$

$$x = 11$$

Ivy is 11
Mike is 44

$$x = \text{ivy}$$

15. Bob is twice as old as his brother Dave. In 7 years from now, Bob will be only one and one-half times as old as Dave. How old are they each now?

$$x = 2y$$

$$y = \frac{2}{3}x$$

$$x + 7 = y + 7 \times \frac{2}{3}$$

$$3x + 21 = 2y$$

$$3x - 2y = 21$$

$$x - 2y = 0$$

$$3x - 2y = 21$$

$$-2x = -21$$

$$x = 10.5$$

Bob = x

Dave = y

Bob is 10 and a half
Dave is 21

16. Robbie is three younger than Richard. Eight years ago, Robbie was one half of Richard's age. How old is each person now?

$$x = y - 3$$

$$x - 8 = \frac{y - 8}{2}$$

$$2x - 16 = y - 8$$

$$2x - y = 8$$

$$x - y = -3$$

$$x = 11$$

$$y = 14$$

Robbie = x
Ritchard = y

Robbie is 11
Ritchard is 14

17. Sandy is four years less than twice Brad's age. In two years, Brad's age will be three-quarters of Sandy's age. How old is each person now?

$$2x - 4 = y$$

$$x + 2 = \frac{3}{4}(y + 2)$$

$$4x + 8 = 3y + 6$$

$$4x - 3y = -2$$

$$y = 10$$

Brad = $x = 16$
sandy = $y = 10$

18. The sum of three numbers is 33. The second number is 7 less than the first, and the third number is three times the second. What are the numbers?

$$x + 7 + x + 3x = 33$$

$$x = \text{middle \#}$$

$$5x = 25$$

$$x = 5$$

$$x + 7 + x + 3x = 33$$

$$5 + 7 = 12 \quad 3 \times 5 = 15$$

The numbers are 12, 5, 15

19. A BMW 325i travelled 1.2 times as fast as a Mercedes Benz. The difference in their speeds was 24km/h. Find the speeds of each car.

$$\begin{aligned} x - y &= 24 \\ 5x - 6y &= 0 \\ 5x - 5y &= 120 \\ -y &= 120 \\ y &= 120 \\ x &= \frac{6}{5}y \end{aligned}$$

$x = \text{BMW}$ $y = \text{Mercedes}$

$$\begin{array}{r} \text{Mercedes Benz speed} \\ 120 \text{ km/h} \\ \text{BMW 325i speed} \\ \hline 144 \text{ km/h} \end{array}$$

20. The least of three consecutive integers is divided by 10, the next is divided by 17, the greatest is divided by 26. What are the numbers if the sum of the quotients is 10?

$$\begin{aligned} \left(\frac{x}{10}\right) + \left(\frac{x+1}{17}\right) + \left(\frac{x+2}{26}\right) &= 10 \\ x \times \frac{1}{10} + (x+1) \times \frac{1}{17} + (x+2) \times \frac{1}{26} &= 10 \end{aligned}$$

$x = \text{smallest \#}$

21. A stick is 60cm long and is cut into three pieces. The middle piece is 2cm longer than the shortest and 2cm shorter than the longest. How long is each piece?

$$\begin{aligned} x + y + z &= 60 \\ x + 2 &= y \\ z - 2 &= y \end{aligned}$$

$$\begin{aligned} x + 2 &= z - 2 \\ x - z &= -4 \\ x + y + z &= 60 \\ x - z &= -4 \\ \hline 2x + y &= 56 \\ x - y &= -2 \\ \hline 3x &= 54 \end{aligned}$$

$$x = 18$$

$$\begin{aligned} 18 + 2 &= y \quad y = 20 \\ 18 + 20 + z &= 60 \\ z &= 22 \end{aligned}$$

$$\begin{aligned} x &= \text{piece 1} \\ y &= \text{piece 2} \\ z &= \text{piece 3} \\ x &= 18 \\ y &= 20 \\ z &= 22 \end{aligned}$$

22. Explain why every integer can be expressed in exactly one of the four forms:

$$6n, 6n+1, 6n+2, 6n+3, 6n+4, 6n+5$$

b) In which of these 5 forms can the prime numbers be expressed? Explain.

c) Show that all prime numbers (except 2 and 3) when divided by 6 leave a remainder of either 1 or 5.

b) $6n+1$ because everytime you divide a number by 6 you will have a remainder of 0, 1, 2, 3, 4, 5

23. Ray has a box of candy bars. He gave Mike half of what he had plus half a bar. Then he gave Chris half of what he had left plus half a bar. After which he gave Larry half of what he had left plus a bar. Then finally again, he gave Andy half of what he had left plus half a bar. Then he had no bars left. How many candy bars did Ray have in the beginning?

$$\begin{aligned} x - \left(\frac{1}{2}x + \frac{1}{2}\right) - \left(\frac{1}{4}x + \frac{1}{4}\right) - \left(\frac{1}{2}x + \frac{5}{8}\right) - \left(\frac{1}{4}x + \frac{1}{2}\right) &= 0 \\ x - \frac{1}{2}x - \frac{1}{2} - \frac{1}{4}x - \frac{1}{4} - \frac{1}{2}x - \frac{5}{8} - \frac{1}{4}x - \frac{1}{2} &= 0 \\ 8x - 4x - 4 - 2x - 4 - x - 8 &= 0 \\ x &= 10 \end{aligned}$$

$x = \text{All the bars}$

24. Suppose "m" and "n" are positive odd integers. Which of the following must also be an odd integer?

(A) $m + 3n$ (B) $3m + n$ (C) $3m^2 + 3n^2$ (D) $(nm + 3)^2$ (E) $3mn$ ✓

odd + odd = even
odd + even = odd
even + odd = odd
even + even = even

25. Let "a", "b", and "c" be numbers with $0 < a < b < c$. Which of the following is impossible?

- (A) ~~$a + c < b$~~ (B) $a \cdot b < c$ (C) $a + b < c$ (D) ~~$a \cdot c < b$~~ (E) ~~$\frac{b}{c} = a$~~
- Handwritten notes:* (B) $1 \times 2 < 3$ (C) $1 + 2 < 4$

26. What is the least positive integer "n" such that "n" is a multiple of 6 and neither "n - 1" or "n + 1" is a prime number?

There are none

27. Assume that weights of coins as follows:

1 Cent coin (penny) - 3grams; 5 cent coin (nickel) 5 grams; 10 cent coin (dime) 2grams;
25 cent coin (quarter) - 9 grams; 1 dollar coin (loonie) - 13 grams; 2 dollar coin (toonie) - 17 grams.

Dan holds at least one of each of the above coins, which a total weight of exactly 220 grams. What is the maximum possible total value of his coins? Give your answer in dollars to the nearest cent.

$$\begin{array}{r} 175770 \\ 17 \\ \hline 59 \\ 34 \\ \hline 13 \end{array}$$

$$\begin{array}{r} 12 \text{ toonies} \\ 1 \text{ loonie} \\ 2 \text{ dimes} \\ \hline \end{array}$$

$$\begin{array}{r} 169 \text{ left} \\ 49 \text{ left} \\ \hline 25.20 \end{array}$$

go from most value coins first then go down

28. In the multiplication problem below, A, B, C, and D are different digits. What is the value of $A + B$?

(A) 1

(B) 2

(C) 3

(D) 4 (E) 9

$$\begin{array}{r} ABA \\ \times CD \\ \hline CDCD \end{array}$$

Handwritten notes: $A=1, B=0$ $\begin{array}{r} 101 \\ \times CD \\ \hline D0D \\ \hline C0C \\ \hline CDCD \end{array}$

29. In the multiplication problem below, the letters G, M, A, T, and H represent different digits. What is the value of $G + M + A + T + H$?

$$\begin{array}{r} 2008 \\ \times HT \\ \hline GMATH \end{array}$$

30. Mr. Young divided \$45 among four students: Andy, Bob, Chris, and Dianna. When the students complained that the shares were not equal, he instructed Bob to give Andy \$2. Then he doubled Chris' share and cut Dianna's share in half. Now all the students have the same amount. How much money do they have in total?

Begin: A B C D

End: $A+2$ $B-2$ $2C$ $\frac{D}{2}$

$A + A + 4 + \frac{1}{2} + 1 + 2A + 4 = 45$

$4.5A + 9 = 45$ $4.5A = 36$

$$A + 2 = B - 2$$

$$A + 4 = B$$

$$A + 2 = 2C$$

$$\frac{A}{2} + 1 = C$$

$$A + 2 = \frac{D}{2}$$

$$D = 2A + 4$$

$$A = 8$$

$$A = 8$$

$$B = 12$$

$$C = 5$$

$$D = 20$$

31. Suppose that

$$ab = 6$$

$$\begin{matrix} 1 & 6 \\ 6 & 1 \\ 2 & 3 \\ 3 & 2 \end{matrix}$$

$$bc = 8$$

$$\begin{matrix} 1 & 8 \\ 8 & 1 \\ 2 & 4 \\ 4 & 2 \end{matrix}$$

$$cd = 10$$

$$\begin{matrix} 1 & 10 \\ 10 & 1 \\ 2 & 5 \\ 5 & 2 \end{matrix}$$

$$de = 12$$

$$\begin{matrix} 1 & 12 \\ 12 & 1 \\ 2 & 6 \\ 6 & 2 \\ 3 & 4 \\ 4 & 3 \end{matrix}$$

What is the value of $\frac{a}{e}$? Express your answer as a common fraction.

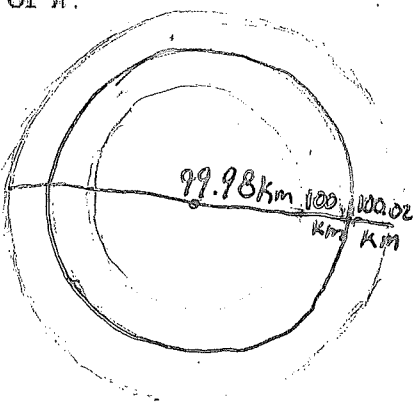
b has to be 1 because they both share 1,
that means $a = 6$ and $c = 8$ then $D = 1.25, e = 9.6$

$$\frac{a}{e} = \frac{6 \times 10}{9.6 \times 10} = \frac{60}{96} = \frac{5}{8}$$

$$\frac{a}{e} = \frac{5}{8}$$

32. Challenge:

King Charles the Short-Sighted rode all the way around the boundary of his kingdom, which is a circle with diameter 100 kilometres. While he rode along, he could see only 20 metres in any direction. What is the total area (both inside and outside his kingdom) of the region that he saw? Assume the world is flat. Express your answer in terms of π .



The Area of the bigger circle minus the area of the smaller circle.

$$\pi \left(\frac{100.02}{2} \right)^2 - \pi \left(\frac{99.98}{2} \right)^2$$

$$a^2 - b^2 = (a - b)(a + b)$$

$$50.01^2 - 49.99^2 = (50.01 - 49.99)(50.01 + 49.99)$$

$$0.02 \times 100 = 2$$

The total area of the region he saw was $2\pi \text{ km}^2$

Name: Kiavash BehravanDate: Nov. 17, 2025M8H HW Ch2 Lesson 5: Solving Equations Involving Reciprocals and Square Roots

1. Solve the following equations and check your answers:

a) $x = \frac{1}{x}$

$x = \pm 1$

b) $\frac{3}{b} = \frac{1}{12}$

$3 = \frac{1}{12}b$

$b = 3 \times 12$

$b = 36$

c) $\frac{a}{5} = \frac{5}{a}$

$a \cdot a = 5 \cdot 5$

$a^2 = 25$

$a = 5$

$a = \pm 5$

d) $\frac{2}{y} = \frac{3}{\left(\frac{1}{2}\right)}$

$\frac{1}{y} \times 2 = 3 \times 2$

$\frac{1}{y} = 6 \times \frac{1}{2}$

$\frac{1}{y} = 3$

$y = \frac{1}{3}$

e) $4 = \frac{2}{3 + \frac{1}{x}}$

$4 = \frac{2}{3 + \frac{1}{x}}$

$12 + \frac{4}{x} = 2$

$\frac{4}{x} = -10$

$-\frac{4}{10} = x, x = -\frac{2}{5}$

f) $\frac{1\frac{1}{4}}{x} = \frac{8}{3}$

$\frac{\frac{5}{4}}{x} = \frac{8}{3}$

$\frac{5}{4x} = \frac{8}{3}$

$15 = 32x, x = \frac{15}{32}$

g) $\frac{8}{x} = \frac{x}{18}$

$8 \times 18 = x \cdot x$

$144 = x^2$

$x = \sqrt{144}$

$x = \pm 12$

h) $\frac{4}{x} = \frac{\left(\frac{1}{9}\right)}{\left(\frac{1}{x}\right)}$

$\frac{4}{x} = \frac{x}{9}$

$36 = x^2$

$x = \sqrt{36}$

$x = \pm 6$

i) $\frac{3\frac{1}{2}}{2} = \frac{9\frac{3}{4}}{n}$

$\frac{7}{2} \times \frac{3}{2} = \frac{66}{n}$

$\frac{3}{4} = \frac{66}{n}$

$21n = 264$

$n = \frac{264}{7}$

m) $\frac{2}{y+5} = \frac{7}{y}$

$7y + 35 = 2y$

$5y = -35$

$y = -7$

j) $\frac{2}{y+5} = \frac{7}{y}$

$7y + 35 = 2y$

$5y = -35$

$y = -7$

k) $\frac{2}{n+10} = \frac{6}{n}$

$6n + 60 = 2n$

$4n = -60$

$n = -15$

l) $\frac{1-x}{4+x} = \frac{2}{3}$

$3 - 2x = 8 + 3x$

$5x = -5$

$x = -1$

n) $\frac{2 + \frac{12}{x}}{\frac{2}{x} + 3} = 4$

$\frac{2x + 12}{3x + 2} = 4$

$2x + 12 = 12x + 8$

$-10x = -4$

$x = \frac{2}{5}$

o) $\frac{4 + \frac{3}{x}}{\frac{3}{x} + 1} = 3$

$4 + \frac{3}{x} = 3\left(\frac{3}{x} + 1\right)$

$4 + \frac{3}{x} = \frac{9}{x} + 3$

$4x + 3 = 9 + x$

$3x = 6$

$x = 2$

p) $\frac{\frac{1}{2} - \frac{2}{x}}{\frac{4}{2} - \frac{1}{x}} = x$

$\frac{\frac{x-8}{2x}}{\frac{8-x}{4x}} = x$

$\frac{x-8}{4x} = \frac{8-x}{4x}$

$4x(x-8) = 4x(8-x^2)$

$4x^2 - 32x = 32x - 4x^3$

$4x^2 + 4x^3 = 64x$

$4x(x+x^2-16) = 0$

2. Solve the following equations by eliminating the root function. Remember to check your solutions!!

a) $3 = \sqrt{2+x}$ $9 = 2+x$ $x = 7$	b) $5 = 2 + \sqrt{4-x}$ $9 = 4-x$ $x = -5$	c) $\sqrt{2x-1} = 4$ $2x-1 = 16$ $2x = 17$ $x = \frac{17}{2}$	d) $3 - \sqrt{\frac{x}{2} + 3} = 1$ $3-1 = \sqrt{\frac{x}{2} + 3}$ $4 = \sqrt{\frac{x}{2} + 3}$ $16 = \frac{x}{2} + 3$ $13 = \frac{x}{2}$ $x = 26$
e) $3 + \sqrt{2x+3} = 2$ $\sqrt{2x+3} = -1$ $2x+3 = 1$ $2x = -2$ $x = -1$	f) $\frac{1}{\sqrt{2x+1}} - 2 = \frac{3}{2}$ $\frac{1}{\sqrt{2x+1}} = \frac{49}{4}$ $4 = 49(\sqrt{2x+1})$ $4 = 98x + 49$ $-45 = 98x$ $x = -\frac{45}{98}$	g) $\sqrt{2+\sqrt{x}} = 2$ $2 + \sqrt{x} = 4$ $\sqrt{x} = 2$ $x = 4$	h) $\sqrt{1+\sqrt{2+\sqrt{x}}} = 3$ $1 + \sqrt{2+\sqrt{x}} = 9$ $\sqrt{2+\sqrt{x}} = 8$ $2 + \sqrt{x} = 64$ $\sqrt{x} = 62$ $x = 3844$
i) $\sqrt{\sqrt{3x}} = 4$ $\sqrt{3x} = 16$ $\sqrt{3x} = 256$ $3x = 65536$ $x = \frac{65536}{3}$	j) $\frac{2}{\sqrt{x}} = \frac{4}{x}$ $\frac{x^2}{x} = 4$ $x = 4$ $\frac{4}{x} = \frac{16}{x^2}$ $4x^2 = 16x$ $x^2 = \frac{16x}{4}$ $x^2 = 4x$	k) $\sqrt{2-2x+1} = 4$ $2-2x = 9$ $-2x = 7$ $x = -\frac{7}{2}$	l) $2 - \sqrt{1+4x} = 1$ $2 = \sqrt{1+4x} + 1$ $1 = \sqrt{1+4x}$ $1 = 1 + 4x$ $4x = 0$ $x = 0$

3. Isolate the indicated variable in each expression:

a) $\frac{A}{B} = \frac{C}{D}$; for C $\frac{A}{B}D = C$ $\frac{AD}{B} = C$	b) $\frac{A}{B} = \frac{C}{D}$; for D $\frac{A}{B} \times \frac{1}{C} = \frac{C}{D} \times \frac{1}{C}$ $\frac{A}{BC} = \frac{1}{D}$ $\frac{BC}{A} = D$	c) $\frac{A}{B} = \frac{C}{D}$; for B $B = \frac{DA}{C}$	d) $\frac{A}{B} + \frac{A}{C} = 1$; for A $A(\frac{1}{B} + \frac{1}{C}) = 1$ $A(\frac{B+C}{BC}) = 1$ $A = \frac{BC}{B+C}$
e) $\frac{A}{B} + \frac{A}{C} = \frac{1}{BC}$; for A $A(\frac{1}{B} + \frac{1}{C}) = \frac{1}{BC}$ $A(\frac{C+B}{BC}) = \frac{1}{BC}$ $A = \frac{1}{BC} \times \frac{BC}{C+B}$ $A = \frac{1}{C+B}$	f) $\frac{A}{B} + \frac{A}{F} = \frac{C}{D}$; for A $A(\frac{1}{B} + \frac{1}{F}) = \frac{C}{D}$ $A(\frac{B+F}{BF}) = \frac{C}{D}$ $A = \frac{C}{D} \times \frac{BF}{B+F}$ $A = \frac{BCF}{D(B+F)}$	g) $\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{D}$; for D $\frac{AB+AC+BC}{ABC} = \frac{1}{D}$ $\frac{ABC}{AB+AC+BC} = D$	h) $\frac{1}{A} + \frac{1}{B} = C$; for A $\frac{1}{A} + \frac{1}{B} = C$ $\frac{A+B}{AB} = C$ $\frac{A+B}{AB} = C$ $\frac{A+B}{AB} \times \frac{AB}{A+B} = C \times \frac{AB}{A+B}$ $1 = C \times \frac{AB}{A+B}$ $\frac{A+B}{A-B} = C$

$$\frac{A+B}{A-B} = C$$

Solve the following equations:

a) $\frac{3}{4 + \frac{x}{3 + \frac{1}{7}}} = 1$ $\frac{3}{4 + \frac{x}{\frac{22}{7}}} = 1$ $\frac{3}{95x} = 1$ $\frac{1}{x} = \frac{95}{3}$ $3 = 95x$ $x = \frac{3}{95}$ $7x = -22$ $x = -\frac{22}{7}$	b) $1 + \frac{x}{2 + \frac{1}{1 - \frac{1}{2}}} = 7$ $1 + \frac{x}{2 + \frac{1}{\frac{1}{2}}} = 7$ $1 + \frac{x}{2 + 2} = 7$ $\frac{x}{4} = 6$ $x = 24$
c) $5\frac{4}{5} = 1 + \frac{x}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$ $5\frac{4}{5} = 1 + \frac{x}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$ $5\frac{4}{5} = 1 + \frac{x}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$ $5\frac{4}{5} = 1 + \frac{x}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$ $32x = 144$ $x = \frac{144}{32} = \frac{9}{2}$	d) $\frac{1}{1 + \frac{2}{1 + \frac{3}{1 + x}}} = 2$ $1 + \frac{2}{1 + \frac{3}{1 + x}} = \frac{1}{2}$ $\frac{2}{1 + \frac{3}{1 + x}} = -\frac{1}{2}$ $1 + \frac{3}{1 + x} = -\frac{1}{2}$ $\frac{3}{1 + x} = -\frac{3}{2}$ $1 + x = -\frac{3}{5}$ $x = -\frac{8}{5}$
e) $1 + \frac{2 + \frac{12}{x}}{\frac{x}{x+3}} = \frac{2}{x}$ $1 + \frac{2 + \frac{12}{x}}{\frac{x}{x+6}} = \frac{2}{x}$ $1 + \frac{2 + \frac{12}{x}}{\frac{x}{x+6}} = \frac{2}{x}$ $1 + \frac{2 + \frac{12}{x}}{\frac{x}{x+6}} = \frac{2}{x}$ $\frac{2}{x} = -1$ $\frac{2}{-1} = x$ $x = -2$	f) $\frac{1}{\sqrt{1 + \frac{1}{\sqrt{1 + \sqrt{x}}}}} = \frac{1}{3}$ $\frac{1}{\sqrt{1 + \frac{1}{\sqrt{1 + \sqrt{x}}}}} = \frac{1}{9}$ $1 + \frac{1}{\sqrt{1 + \sqrt{x}}} = 9$ $\frac{1}{\sqrt{1 + \sqrt{x}}} = 8$ $\sqrt{1 + \sqrt{x}} = \frac{1}{8}$ $1 + \sqrt{x} = \frac{1}{64}$ $\sqrt{x} = -\frac{63}{64}$ $x = \left(-\frac{63}{64}\right)^2$ $x = \frac{3969}{4096}$

5. Suppose that "a", "b", "c", and "d" are positive integers such that the equation below is true, what is the value of $a + b + c + d$?

$$a + \frac{1}{b + \frac{1}{c + \frac{1}{d}}} = \frac{37}{11}$$

$$\textcircled{a} + \frac{1}{b + \frac{1}{c + \frac{1}{d}}} = \textcircled{3} + \frac{4}{11}$$

$$\frac{1}{b + \frac{1}{c + \frac{1}{d}}} = \frac{4}{11}$$

$$\textcircled{b} + \frac{1}{c + \frac{1}{d}} = \textcircled{2} + \frac{3}{11}$$

$$\frac{1}{c + \frac{1}{d}} = \frac{3}{11}$$

$$\textcircled{c} + \frac{1}{d} = \textcircled{1} + \frac{1}{11}$$

$$\frac{1}{d} = \frac{1}{11}$$

$$d = 11$$

$$\begin{aligned} a &= 3 \\ b &= 2 \\ c &= 1 \\ d &= 5 \end{aligned}$$

The sum is 9

6. Solve for "x"

$$4 = \sqrt{x + \sqrt{x + \sqrt{x + \sqrt{x + \dots}}}}$$

$$16 = x + \sqrt{x + \sqrt{x + \sqrt{x + \dots}}} = 4$$

$$16 = x + 4$$

$$\boxed{x = 12}$$

7. Solve for "x"

$$\left(\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \frac{1}{4 \cdot 5} + \frac{1}{5 \cdot 6} + \dots + \left(\frac{1}{2008 \cdot 2009} \right) + \left(\frac{1}{2009 \cdot 2010} \right) \right) = \frac{1}{x}$$

$$\frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \frac{1}{4} - \dots - \frac{1}{2008} + \frac{1}{2009} - \frac{1}{2009} + \frac{1}{2010} = \frac{1}{x}$$

$$1 - \frac{1}{2010} = \frac{1}{x} \quad x = \frac{2010}{2009}$$

8. Challenge: Solve for "x"

$$\sqrt{x-1} + 4 = 3 + \sqrt{x+1}$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$\sqrt{x-1} = \sqrt{x+1} - 1$$

$$x-1 = x+1 - 2\sqrt{x+1} + 1$$

$$x - x - 1 - 1 - 1 = -2\sqrt{x+1}$$

$$-3 = -2\sqrt{x+1}$$

$$\frac{3}{2} = \sqrt{x+1}$$

$$\frac{9}{4} = x+1$$

$$\boxed{x = \frac{5}{4}}$$

Name: Kiavash BehravanDate: NOV. 20, 2025**M8H HW Ch2 Lesson 6 : Simplifying Polynomials - Distributions and FOIL**

1. Indicate whether if the following pairs are liketerms are not. If they are, simplify the expression:

a) $3ab + 5ba$ <u>$8ab$</u>	b) $5a^2b + 8ab^2$ <u>no</u>	c) $9^2ab + 3ab$ <u>$84ab$</u>	d) $12abc - 11cab$ <u>abc</u>
e) $4xyz + 9xy^2$ <u>no</u>	f) $8(a+b) - 2ab$ $8a + 8b - 2ab$ <u>$14ab$</u>	g) $\frac{1}{2ab} + 3ab$ <u>no</u>	h) $\frac{1}{3}cd + 3d^2c$ <u>no</u>
i) $3mn + 5(nm+1)$ $3mn + 5nm + 5$ <u>$8mn + 5$</u>	j) $3a^3b^2 - 12b^3a^2$ <u>no</u>	k) $12y^3x^2z^2v - 5z^2x^2y^3w$ <u>no</u>	l) $\frac{3a^3b}{1} + 8ba^2$ <u>no</u>

2. Expand and Simplify each of the following equations:

a) $3(2x+3y+1)$ <u>$6x + 9y + 3$</u>	b) $3a(2a^2+3ab)$ <u>$6a^3 + 9a^2b$</u>	c) $4a - 3(2a+1)$ $4a - 6a - 3$ <u>$-2a - 3$</u>
d) $6(3-2x)+7x$ $18 - 12x + 7x$ <u>$18 - 5x$</u>	e) $2(2x+1) - 3(1-2x)$ $4x + 2 - 3 + 6x$ <u>$10x - 1$</u>	f) $3(2+4x) - 7x$ $6 + 12x - 7x$ <u>$6 + 5x$</u>
g) $-4(2x+x-x) - 3x$ $-8x - 4x + 4x - 3x$ $-8x - 3x$ <u>$-11x$</u>	h) $3(x-1) + 2(2x+1)$ $3x - 3 + 4x + 2$ <u>$7x - 1$</u>	i) $-3(-5x-1) + 2x(1-x)$ $15x + 3 + 2x - 2x^2$ <u>$17x - 2x^2 + 3$</u>
j) $3x(6x+3y+1) - 4y(2x)$ $18x^2 + 9xy + 3x - 8xy$ <u>$18x^2 + xy + 3x$</u>	k) $-3x(4x+3y) - 9y(2x+1)$ $-12x^2 - 9xy - 18xy - 9y$ <u>$-12x^2 - 27xy - 9y$</u>	l) $7x^2(2y-1) - 8y(3x^2-x)$ $14x^2y - 7x^2 - 24x^2y + 8xy$ <u>$-10x^2y - 7x^2 + 8xy$</u>

m) $3(2ab-2b-a)-7ab-7b$ $6ab-6b-3a-7ab-7b$ $-ab-13b-3a$	n) $-3ab(7a+12b+11)-7b(a^2+10ab-2)$ $-21a^2b-36ab^2-33ab-7a^2b-70ab^2+14b$ $-28a^2b-106ab^2-33ab+14b$
o) $3(x-y)+8(y-2x)-3(3y+3)$ $3x-3y+8y-16x-9y-9$ $-13x-4y-9$	p) $2x(3x^2+1)-3x^2(3-3x)-8(3x^2+9x^3)$ $6x^3+2x-9x^2+9x^3-24x^2-72x^3$ $67x^3-33x^2+2x$
q) $-11(3x-8y)-5(3y-9x)-4(11y-12+3x)$ $-33x+88y-15y+45x-44y+48-12x$ $-59y+48$	r) $-11(3x-8y)-5(8y-3x)-4(13x-8y)$ $-33x+88y-40y+15x-52x+32y$ $-70x+76y$

3. FOIL and Simplify the following

a) $2x(2x+3)$ $4x^2+6x$	b) $4x(5x-3)$ $20x^2-12x$	c) $(2x+1)(4x)$ $8x^2+4x$
d) $(2x-3)(4x+1)$ $8x^2+2x-12x-3$ $8x^2-10x-3$	e) $(6x-3)(3x+2)$ $18x^2+12x-9x-6$ $18x^2+3x-6$	f) $(4x-3)(4x+3)$ $16x^2+12x-12x-9$ $16x^2-9$

Name: Kiavash BehravaneshDate: NOV. 22, 2025**M8H HW CH2 Lesson 7 Factoring GCF and Trinomials**

1. Find the GCF and then factor out the GCF

a) $8x^2y - 26xy^2$ GCF = $2xy$ $2xy(4x - 13y)$	b) $25x^3y^2 + 55xy^2 + 10xy$ GCF = $5xy$ $5xy(5x^2y + 11y + 2)$
c) $10xyz^2 + 15x^3z^5 - 35x^2yz^2$ GCF = $5xyz^2$ $5xyz^2(2 + 3x^2z^3 - 7x)$	d) $24bc^3 - 72a^3bc^2 + 88a^2b^3c$ GCF = $8a^2bc$ $8a^2bc(3c^2 - 9ac + 11b^2)$
e) $x^2(2x-1) + 5x(1-2x)$ GCF = x $2x^3 - x^2 + 5x - 10x^2$ $x(2x^2 - x + 5 - 10x)$	f) $8x^2(6x-10) + 12x^3(3x-5)$ GCF = $4x^2$ $48x^3 - 80x^2 + 36x^4 - 60x^3$ $4x^2(12x - 20 + 9x^2 - 15x)$
g) $27x^3y^2 + 18x^2y^3 - 45xy^4$ GCF = $9xy^2$ $9xy^2(3x^2 + 2xy - 5y^2)$	h) $18xy^2(2-3x) - 12xy(15-10x) + 9x^2y(6-4x)$ $36xy^2 - 54x^2y^2 - 60xy + 120x^2y + 54x^2y - 36x^3y$ $6xy(6y - 9xy - 10 + 20x + 9x - 6x^2)$ GCF = $6xy$

2. Given each expression, find the missing value in the box:

- a. $x^2 - 11x - 12 = (x - \boxed{?})(x + 1)$
 $\begin{array}{r} x \quad -12 \\ x \quad -1 \end{array}$
 $(x+1)(x-12)$
- b. $x^2 - 29x + 120 = (x - \boxed{?})(x - 5)$
 $\begin{array}{r} x \quad -24 \\ x \quad -5 \end{array}$
 $(x-5)(x-24)$
- c. $x^2 - 13x + 12 = (x + \boxed{?})(x + \boxed{?})$
 $\begin{array}{r} x \quad -12 \\ x \quad -1 \end{array}$
 $(x-1)(x-12)$
- d. $x^2 - \boxed{?}x + 44 = (x - \boxed{?})(x - 11)$
 $\begin{array}{r} x \quad -11 \\ x \quad -4 \end{array}$
 $x^2 - 15x + 44 = (x-4)(x-11)$
- e. $x^2 - 2x - 15 = (x + \boxed{?})(x + \boxed{?})$
 $\begin{array}{r} x \quad -5 \\ x \quad 3 \end{array}$
 $(x+3)(x-5)$
- f. $x^2 - 12x + \boxed{?} = (x - \boxed{?})(x - 7)$
 $\begin{array}{r} x \quad -7 \\ x \quad -5 \end{array}$
 $x^2 - 12x + 35 = (x-5)(x-7)$
- g. $x^2 - 15x - \boxed{?} = (x + 5)(x + \boxed{?})$
 $\begin{array}{r} x \quad -20 \\ x \quad 5 \end{array}$
 $x^2 - 15x - 100 = (x+5)(x-20)$
- h. $3x^2 - 3x - 36 = (3x + \boxed{?})(x + \boxed{?})$
 $\begin{array}{r} 3x^2 - 12 \\ x \quad -4 \\ x \quad 3 \end{array}$
 $3(x^2 - x - 12) = (3x+9)(x-4)$
 $3(x+3)(x-4) = (3x+9)(x-4)$

3. Factor each of the following expressions. Show all your steps and work:

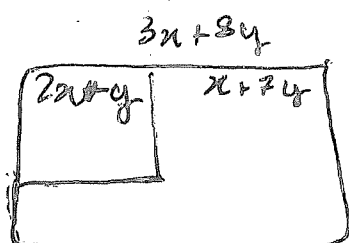
a. $x^2 + 7x + 6$ $\begin{array}{r} 1 \quad 6 \\ \times \\ 1 \end{array}$ $(x+1)(x+6)$	b. $x^2 + 25x + 24$ $\begin{array}{r} 1 \quad 24 \\ \times \\ 1 \end{array}$ $(x+1)(x+24)$
c. $x^2 + 10x + 21$ $\begin{array}{r} 1 \quad 3 \\ \times \\ 1 \quad 7 \end{array}$ $(x+3)(x+7)$	d. $x^2 - 10x + 24$ $\begin{array}{r} 1 \quad -6 \\ \times \\ 1 \quad -4 \end{array}$ $(x-4)(x-6)$
e. $x^2 + 3x - 40$ $\begin{array}{r} 1 \quad -5 \\ \times \\ 1 \quad 8 \end{array}$ $(x+8)(x-5)$	f. $3x^2 - 15x - 42$ $3(x^2 - 5x - 14)$ $\begin{array}{r} 1 \quad -7 \\ \times \\ 1 \quad 2 \end{array}$ $3(x-7)(x+2)$
g. $4x^2 - 36x + 72$ $4(x^2 - 9x + 18)$ $\begin{array}{r} 1 \quad -3 \\ \times \\ 1 \quad -6 \end{array}$ $4(x-6)(x-3)$	h. $x^3 + 8x^2 - 20x$ $x(x^2 + 8x - 20)$ $\begin{array}{r} 1 \quad 10 \\ \times \\ 1 \quad -2 \end{array}$ $x(x-2)(x+10)$
i. $2x^2y + 28xy + 42y$ $2y(x^2 + 14x + 21)$	j. $3x^3y - 81x^2y + 150xy$ $3xy(x^2 - 27x + 50)$ $\begin{array}{r} 1 \quad -25 \\ \times \\ 1 \quad -2 \end{array}$ $3xy(x-2)(x-25)$
k. $5x^2 + 20xy - 105y^2$ $5(x^2 + 4xy - 21y^2)$ $\begin{array}{r} x \quad 7y \\ \times \\ x \quad -3y \end{array}$ $5(x-3y)(x+7y)$	l. $x^4 - 8x^2 + 12$ $\begin{array}{r} x^2 \quad -6 \\ \times \\ x^2 \quad -2 \end{array}$ $(x^2-2)(x^2-6)$
m. $-x^4 - 10x^2 - 21$ $-(x^4 + 10x^2 + 21)$ $\begin{array}{r} x^2 \quad 3 \\ \times \\ x^2 \quad 7 \end{array}$ $-(x^2+7)(x^2+3)$	n. $-x^4 - 4x^2y + 45y^2$ $-x^2$ $\text{[Crossed out circle with 2]}$

g) $(3x+4)(2x-3)$ $6x^2 - 12x + 8x - 12$ $6x^2 - 4x - 12$	h) $(4x-1)(3x+2)$ $12x^2 + 8x - 3x - 2$ $12x^2 + 5x - 2$	i) $(7x-1)(4x-5)$ $28x^2 - 35x - 4x + 5$ $28x^2 - 39x + 5$
j) $(12x-3)(8x-10)$ $96x^2 - 120x - 24x + 30$ $96x^2 - 144x + 30$	k) $(6x-8)(4x+6)$ $24x^2 + 36x - 32x - 48$ $24x^2 + 4x - 48$	l) $(2x+1)(3x^2+5x-6)$ $6x^3 + 10x^2 - 12x + 3x^2 + 5x - 6$ $6x^3 + 13x^2 - 7x - 6$

4. Given that the area of a rectangle is represented by: $x^2 + 7x + 12$, find an expression for the length and width in terms of "x".

$$\begin{array}{c}
 x^2 + 7x + 12 \\
 \downarrow \quad \quad \quad \swarrow \quad \searrow \\
 (x+3)(x+4) \\
 \swarrow \quad \searrow \\
 (x+4)(x+3)
 \end{array}$$

5. A large rectangle has a length of $3x+8y$ and a width of $5x+2y$. A small square with lengths of $2x+y$ is cut out of the rectangle. What is the area of the remaining shape?



$$\begin{aligned}
 &[(3x+8y)(5x+2y)] - (2x+y)^2 = \\
 &15x^2 + 6xy + 40xy + 16y^2 - 4x^2 - 4xy - y^2 = \\
 &11x^2 + 46xy + 15y^2
 \end{aligned}$$

6. Given that the width of a rectangle is: $6x$ and the area is: $6x^3 + 30x^2 + 24x$, what is the length of the rectangle in terms of "x"?

$$\begin{array}{c}
 ? \\
 \boxed{6x^3 + 30x^2 + 24x} \quad 6x
 \end{array}$$

$$\begin{aligned}
 (6x)(\quad) &= 6x^3 + 30x^2 + 24x \\
 (6x)(x^2) &= 6x^3 \\
 (6x)(x^2 + 5x) &= 6x^3 + 30x^2 \\
 (6x)(x^2 + 5x + 4) &= 6x^3 + 30x^2 + 24x \\
 \text{Length} &= (x^2 + 5x + 4)
 \end{aligned}$$

$$6x^2 \quad 6x^3 + 33x^2 + 21x + 3$$

$$(6x+3)(x^2) = 6x^3$$

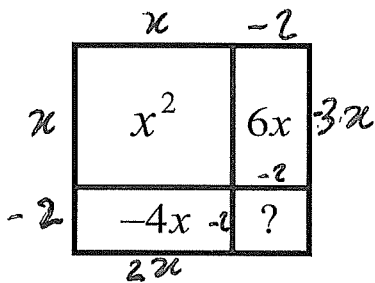
$$(6x+3)(x^2+5x) = 6x^3 + 30x^2$$

$$(6x+3)(x^2+5x) = 6x^3 + 33x^2$$

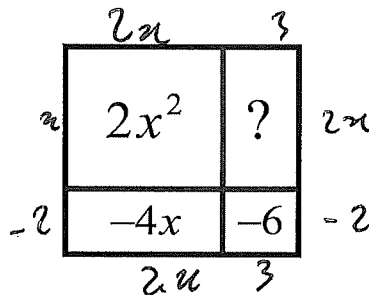
$$(6x+3)(x^2+5x+1) = 6x^3 + 33x^2 + 6x + 3$$

$$(6x+3)(x^2+5x+1) = 6x^3 + 33x^2 + 21x + 3$$

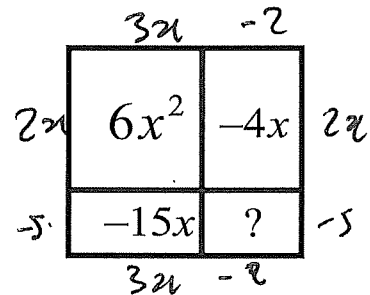
$$(6x+3)(x^2+5x+1) - 6x = 6x^3 + 33x^2 + 21x + 3 + 6x - 6x$$

$$(6x+3)(x^2+5x+1)-6x$$


$$\text{Area} = -4$$



$$\text{Area} = 6u$$



Area = -10

A square with side length $x+3$ is divided into four regions by a horizontal line of length x and a vertical line of length x . The regions are: a large square of side x (bottom-left), a vertical rectangle of width 3 and height x (bottom-right), a horizontal rectangle of width x and height 3 (top-left), and a small square of side 3 (top-right). The labels x and 3 are placed along the edges of the square to indicate dimensions.

$$(3x)^2 - 3^2 = 150$$

$$9x^2 - 9 = 150$$

$$9x^2 = 1.54$$

$$x^2 = \frac{159}{9}$$

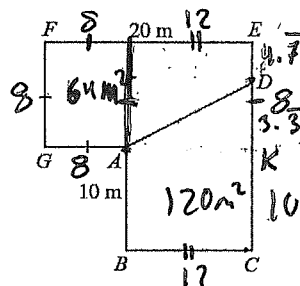
$$x = \sqrt{\frac{159}{9}}$$

In the diagram, $ABCDEFGH$ is a room having square corners, with $EF = 20$ m, $AB = 10$ m, and $AG = GF$. The total area of the room is 280 m^2 . A wall is built from A to D creating two rooms of equal area. What is the distance, in metres, from C to D ?

- (B) $\frac{50}{3}$

- (D) 13

- (E) $\frac{40}{3}$



$$n = 8$$

$$X = FG$$

$FG = 8$

$y = ED$

$$\begin{array}{r} 12 \\ \times 4.7 \\ \hline 84 \\ 48 \\ \hline 56.4 \\ \cancel{20} \times 12 \\ \hline 2 \end{array} = 20$$

$$x \times 12 = 40$$

$$x = \frac{40}{12}$$

$$x = 3\frac{1}{3}$$

$$x = 3.\overline{3}$$

$$\begin{array}{r} -18.0 \\ 4.7 \\ \hline 13.3 \end{array}$$

$$[20(10+x)] - 10x = 280$$

$$(200 + 20x) - 10x = 280$$

$$200 + 10x = 280$$

$$10x = 90$$

$x = 8$

$$120 = 12(10 + K)$$

$$140 = 60 + 6k^2$$

80 = 6k

The Distance from c to D is $\frac{40}{3}$ metres

$$120 + 2 = 64 + ?$$

↓
140

and

↓
140

Name: Kiavash BehmaveshDate: NOV. 27, 2025**M8H HW CH2 Lesson 8 Multiplying Polynomials**

1. Simplify each of the following expressions:

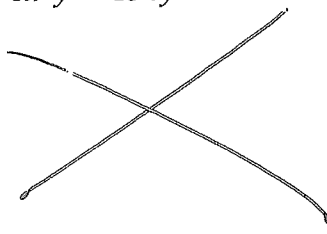
a) $3abc(8ab^4c)$ $24a^2b^5c^2$	b) $(-13ab^3c)(-2a^3)(9bc^3)$ $234a^4b^4c^4$	c) $8ab(12-3a+7ac)$ $96ab-24a^2b+56a^2bc$
d) $6abc(2a+4b-7)$ $12a^2bc+24ab^2c-42abc$	e) $12ab^3(1+2a^2b^3-3a)$ $12ab^3+24a^3b^6-36a^2b^3$	f) $2a^2b(15ac^2-bc)$ $30a^3bc^2-2a^2b^2c$
g) $-4a^2b(2a+4bc)$ $-8a^3b-16a^2b^2c$	h) $4abc^3(9a^2-3b^2c)$ $36a^3bc^3-12ab^3c^4$	i) $-3ac(3a^3+4a^2b-12c)$ $-9a^4c-12a^3bc+36ac^2$
j) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4	k) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4	l) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4
m) $\frac{18ab-36a^3b}{9ab}$ $2-4a^2$	n) $\frac{20ab-16b}{4b}$ $5a-4$	o) $\frac{3ab^2-12ab^3}{3ab}$ $b-4b^2$
p) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4	q) $\frac{-24x^3y-16x^2y-12y^3x}{4xy}$ $-6x^2-4x-3y^2$	r) $\frac{-15x^3y^2z-20x^3y+35y^3x^3}{5x^2}$ $-3xy^2z-4xy+7xy^3$

2. Expand and simplify each of the following

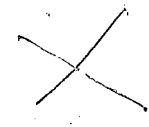
$= (2x-1)(3x+2)$ $= 6x^2 + 4x - 3x - 2$ $= 6x^2 + x - 2$	$(2x-1)(3x+2)$
$(4x-3)(5x+2)$ $20x^2 + 8x - 15x - 6$ $20x^2 - 7x - 6$	$(5x-4)^2$ $5^2x^2 - 4^2$ $25x^2 - 16$
$(2x-3)(5x+4)$ $10x^2 + 8x - 15x - 12$ $10x^2 - 7x - 12$	$(2x+y-2)^2$ $(2^2x^2 + y^2 - 2^2)$ $4x^2 + y^2 - 4$

3. Expand and simplify the following. Combine like terms and reduce your equation

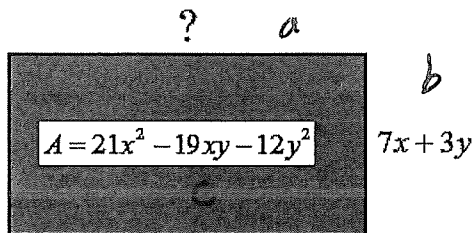
$(2x-3)(4x^2-6x+5)$ $8x^3 - 12x^2 + 10x - 12x^2 + 18x - 15$ $8x^3 - 24x^2 + 28x - 15$	$(4x+1)(7x^2-8x+9)$ $28x^3 - 32x^2 + 36x + 7x^2 - 8x + 9$ $28x^3 - 25x^2 + 28x + 9$
$(3x-2)(5x^2+11x-10)$ $15x^3 + 33x^2 - 30x - 10x^2 - 22x + 20$ $15x^3 + 23x^2 - 52x + 20$	$(2x+1)(2x-1)(3x+2)(3x-2)$ $4x^2 - 2x + 2x - 1 - (9x^2 + 6x + 6x - 4)$ $4x^2 - 2x + 2x - 1 - 9x^2 + 6x - 6x + 4$ $-5x^2 + 3$
$(3x+4)(3x+2)(3x-2)$ $6x^2 + 4x - 3x - 2 - 5x^2 + 11x - 12$ $x^2 + 12x - 14$	$2x(2x-3) - 4x(3-2x) + 5x(6-4x)$ $4x^2 - 6x - 12x + 8x^2 + 30x - 20x^2$ $-8x^2 + 12x$
$(2x-1)(5x-3)(4x+2)$ $(10x-6x-5x+3)(4x+2)$ $(4x-11x+3)(4x+2)$ $40x^2 + 20x - 44x^2 - 22x + 12x + 6$ $-4x^2 + 10x + 6$	$(3x+1)^2 - (3x+4)(2x+3)$ $(3^2x^2 + 1^2) - (6x^2 + 9x + 8x + 12)$ $9x^2 + 1 - 6x^2 - 9x - 8x - 12$ $3x^2 - 17x - 11$

o) $-2x^4 + 8x^2y^2 - 154y^4$ 	p) $3x^4 - 3x^2y^2 - 216y^4$ $3(x^4 - x^2y^2 - 72y^4)$ $\begin{array}{r} x^2 \\ x^2 \\ \end{array}$ $3(x^2 + 8y^2)(x^2 - 9y^2)$
q) $2x^2(3-2x) + 24x(2x-3) + 54(3-2x)$ $2x^2(-(2x-3)) + 24x(2x-3) + 54(-(2x-3))$ $-2x^2(2x-3) + 24x(2x-3) - 54(2x-3)$ $(2x-3)(-2x^2 + 24x - 54)$ $-2(2x-3)(x^2 - 12x + 27)$ $-2(2x-3)(x-9)(x-3)$	r) $2x^2(x-y) - 14xy(x-y) + 88y^2(y-x)$ $2x^2(x-y) - 14xy(x-y) + 88y^2(-(x-y))$ $2x^2(x-y) - 14xy(x-y) - 88y^2(x-y)$ $(x-y)(2x^2 - 14xy - 88y^2)$ $2(x-y)(x^2 - 7xy - 44y^2)$ $2(x-y)(x+4y)(x-11y)$

4. Evaluate the following by factoring and without using a calculator

a) $\frac{17^2 - 17 + 6}{17 + 2}$ Let $x = 17$ $\frac{x^2 - x + 6}{x + 2}$ 	b) $(15)^2 + 17(15) + 60$ Let $x = 15$ $x^2 + 17x + 60$
c) $\frac{17^2 - 9(17) + 20}{(17) + 5}$ Let $x = 17$ $\frac{x^2 - 9x + 20}{x + 5} = \frac{(x-5)(x-4)}{x+5}$ $\frac{(17-5)(17-4)}{22}$	d) $\frac{17^3 + 2(17)^2 + 34(17)}{17^2 + 17 + 60}$ Let $x = 17$ $\frac{x^3 + 2x^2 + 34x}{x^2 + 17x + 60} = \frac{x^2 + 2x + 34}{x + 5} = \frac{x^2 + 2x + 34}{x + 5}$ $= 21$
e) $\frac{(13)^2 - 4(13)(11) - 12(11)}{(13) - 2(11)}$ Let $x = 13$ & $y = 11$ $\frac{x^2 - 4xy - 12y}{x - 2y}$ $= \frac{(x+2y)(x-6)}{x-2y}$	f) $\frac{(7)^2 + 3(7)(9) - 10(9)^2}{(7) + 5(9)}$ Let $x = 7$ & $y = 9$ $\frac{x^2 + 3xy - 10y^2}{x + 5y} = \frac{(x-2y)(x+5y)}{x+5y}$ $= x - 2y = 7 - 2 \times 9 = 7 - 18 = -11$
g) $\left(\frac{2}{7}\right)^2 - 4\left(\frac{2}{7}\right)\left(\frac{3}{7}\right) - 5\left(\frac{3}{7}\right)^2$ Let x be $\frac{2}{7}$ & y be $\frac{3}{7}$ $\frac{x^2 - 4xy - 5y^2}{x - 5y} = \frac{(x-5y)(x+y)}{x-5y}$ $= x + y = \frac{2}{7} + \frac{3}{7} = \frac{5}{7}$	h) $\left(\frac{3}{4}\right)^2 + 3\left(\frac{3}{4}\right)\left(\frac{1}{4}\right) + 2\left(\frac{1}{4}\right)^2$ Let $x = \frac{3}{4}$ & $y = \frac{1}{4}$ $\frac{x^2 + 3xy + 2y^2}{x + 2y} = \frac{(x+y)(x+2y)}{x+2y}$ $= x + y = \frac{3}{4} + \frac{1}{4} = 1$

5. The area of a rectangle is given by the expression: $21x^2 - 19xy - 12y^2$ and the width is $7x + 3y$. Find the length of the rectangle:



$$ab = c \quad \frac{21x^2 - 19xy - 12y^2}{7x + 3y} =$$

$$a = \frac{c}{b}$$

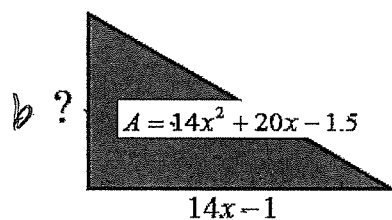
$$\frac{(7x+3y)(3x-4y)}{7x+3y} = c$$

$$(7x+3y)(?) = 21x^2 - 19xy - 12y^2$$

$$\begin{array}{r} 21x^2 \\ -19xy \\ -12y^2 \end{array}$$

The length is $3x - 4y$

6. The area of a triangle is given by the expression: $14x^2 + 20x - 1.5$ and the width is $14x - 1$. Find the length of the rectangle:



$$\frac{2(14x^2 + 20x - 1.5)}{14x - 1} = b$$

$$\frac{28x^2 + 40x - 3}{14x - 1} = b$$

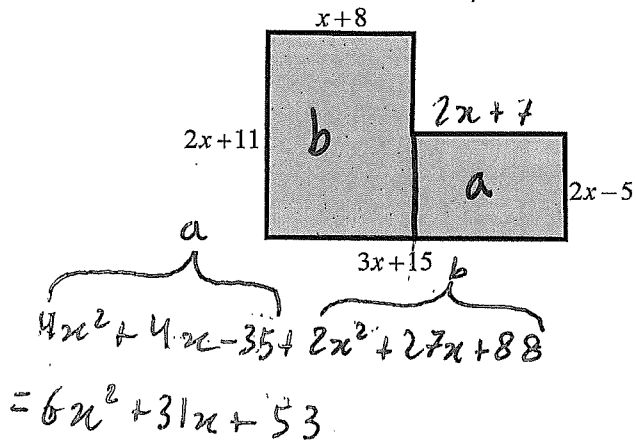
$$(14x - 1)(2x + 3) = 28x^2 + 40x - 3$$

$$\frac{(14x-1)(2x+3)}{(14x-1)} = b$$

The height is $2x + 3$

7. Suppose the equation $x^2 + kx + 24 = (x - a)(x - b)$, where "a" and "b" are integers. What are all the possible values of "k"?

8. Find the area of the shape in terms of "x"



$$3x + 15 - x - 8 = 2x + 7$$

$$a = (x - 5)(2x + 7)$$

$$b = (x + 8)(2x + 11)$$

$$a = 4x^2 + 14x - 10x - 35$$

$$\star a = 4x^2 + 4x - 35$$

$$b = 2x^2 + 11x + 16x + 88$$

$$\star b = 2x^2 + 27x + 88$$

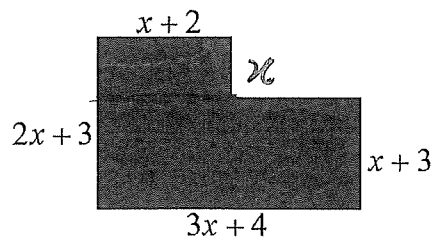
The area of the shape is $6x^2 + 31x + 53$

$i) (3x-1)^3$ $(3^3x^3-1^3)$ $9x^3-1$	$j) (3x+1)(5x+2)(3x-4)-2x^3+4x^2$ $(15x^2+6x+5x+2)(3x-4)-2x^3+4x^2$ $(15x^2+11x+2)(3x-4)-2x^3+4x^2$ $45x^3-60x^2+33x^2-44x+6x-8-2x^3+4x^2$ $43x^3-23x^2-38x-8$
$k) (2x-1)(2x+1)(2x-1)(2x+1)$ $(2x-1)^2(2x+1)^2$ $(4x^2-1)(4x^2+1)$ $16x^4+\cancel{4x^2}-\cancel{4x^2}-1$ $16x^4-1$	$l) (3x+1)^2-(x-4)^2-(2x+3)^2$ $(3^2x^2+1^2)-(x^2-4^2)-(-2^2x^2-3^2)$ $(9x^2+1)(-x^2-16)(-4x^2-9)$ $(-9x^4-144x^2-x^2-16)(4x^2-9)$ $(-9x^4-145x^2-16)(4x^2-9)$ $-36x^6+81x^4-580x^4+1305x^2-64x^2+144$ $-36x^6-499x^4+1241x^2+144$

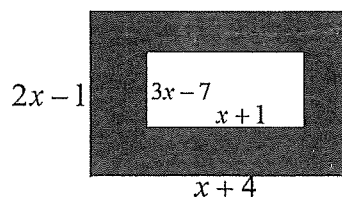
4. What is the difference between "simplifying" an expression and "solving" an equation?

when you simplify an expression, you don't end up finding out what the variables stand for; but when you solve an equation, you end with the values of each variable found.

5. Find the area of the shaded region for each of the following diagrams:

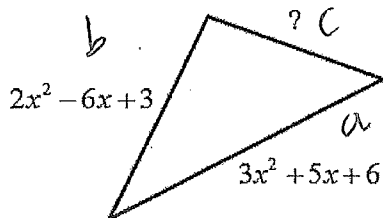


$$\begin{aligned}
 &(x)(x+2) + (3x+4)(x+3) \\
 &(x^2+2x) + (3x^2+9x+4x+7) \\
 &(x^2+2x) + (3x^2+13x+7) \\
 &4x^2+15x+7
 \end{aligned}$$



$$\begin{aligned}
 &(2x-1)(x+4) - (3x-7)(x+1) \\
 &(2x^2+8x-x-4) - (3x^2+3x-7x-7) \\
 &2x^2+8x-x-4-3x^2-3x+7x+7 \\
 &-x^2+11x+3
 \end{aligned}$$

6. The perimeter of a triangle is $6x^2 + 7x - 12$. Find the missing side.



perimeter:

	$6x^2$	$+7x$	-12
a:	$+3x^2$	$-5x$	$+3$
b:	$+2x^2$	$+6x$	$+6$
c:	x^2	$8x$	-3

The missing side is $x^2 + 8x - 3$

7. Given the area and length of one side of a rectangle, find the width in terms of "x":

a) $A = 10x^2 - 11x - 6$, $L = (2x - 3)$

$$\frac{10x^2 - 11x - 6}{2x - 3}$$

$$\frac{(2x-3)(5x+2)}{2x-3} = 5x+2$$

The width is $5x+2$

b) $A = 18x^2 - 93x + 84$; $L = (6x - 7)$

$$\frac{18x^2 - 93x + 84}{6x - 7}$$

$$\frac{(6x-7)(3x-12)}{6x-7} = 3x-12$$

The width is $3x-12$

8. Given that: $(1 + x + x^2 + x^3 + x^4)^2 = Ax^8 + Bx^7 + Cx^6 + Dx^5 + Ex^4 + Fx^3 + Gx^2 + Hx + 1$

What is the value of $A+B+C+D+E+F+G+H$?

$$(1 + x + x^2 + x^3 + x^4)(1 + x + x^2 + x^3 + x^4)$$

$$= 1 + x + x^2 + x^3 + x^4 + x + x^2 + x^3 + x^4 + x^2 + x^3 + x^4 + x^5 + x + x^2 + x^3 + x^4 + x^5 + x^6 + x + x^2 + x^3 + x^4 + x^5 + x^6 + x^7 + x + x^2 + x^3 + x^4 + x^5 + x^6 + x^7 + x^8$$

$$= 1x^8 + 2x^7 + 3x^6 + 4x^5 + 4x^4 + 3x^3 + 2x^2 + 5x + 1$$

Ax^8	Bx^7	Cx^6	Dx^5	Ex^4	Fx^3	Gx^2	Hx	1
1	2	3	4	4	3	2	5	1

variable

of x^4

$$1+2+3+4+4+3+2+5=24$$

Therefore

$A=1$ $B=2$ $C=3$ $D=4$ $E=4$ $F=3$ $G=2$ $H=5$

$$A+B+C+D+E+F+G+H = 24$$

Name: Kiavash BehroozDate: NOV. 28, 2025**M8H HW Ch2 Lesson 9 Factoring a Difference of Squares**

1. Multiply each of the following binomials with it's conjugate:

a) $(2x-3)(2x+3) = (2x)(2x) - (-3)(3)$ $4x^2 - 9$	b) $(4x-3)(4x+3) = (4x)(4x) - (-3)(3)$ $16x^2 - 9$
c) $(7x-1)(7x+1) = (7x)(7x) - 1$ $49x^2 - 1$	d) $(9x-5)(9x+5) = (9x)(9x) - (-5)(5)$ $81x^2 - 25$
e) $(10x-11y)(10x+11y) = (10x)(10x) - (-11y)(11y)$ $100x^2 - 121y^2$	f) $(15x+4y)(15x-4y) = (15x)(15x) - (-4y)(4y)$ $225x^2 - 16y^2$

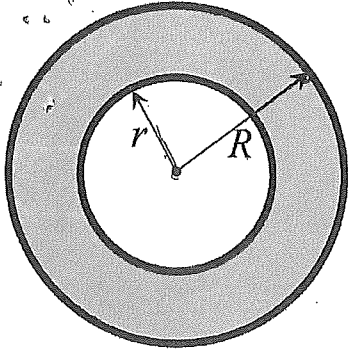
2. Indicate the missing value in the box for each of the following

a) $16 - 25x^2 = (4 - \boxed{?})(4 + \boxed{?})$ $\sqrt{25} = 5$ $(4 - 5)(4 + 5)$	b) $121 - 81x^2 = (11 - \boxed{?})(\boxed{?} + \boxed{?})$ $\sqrt{121} = 11$ $\sqrt{81x^2} = 9x$ $(11 - 9x)(11 + 9x)$
c) $\boxed{?} - 100y^2 = (5x - \boxed{?})(5x + \boxed{?})$ $5^2 = 25$ $\sqrt{100y^2} = 10y$ $25x^2 - 100y^2 = (5x - 10y)(5x + 10y)$	d) $98y^2 - 162x^2 = \boxed{?}(\boxed{?} - \boxed{?})(\boxed{?} + \boxed{?})$ $49y^2 - 81x^2 = 2(7y - 9x)(7y + 9x)$ $\sqrt{49y^2} = 7y$ $\sqrt{81x^2} = 9x$
e) $\boxed{?} - 144x^4 = 4(9x - \boxed{?})(\boxed{?} + \boxed{?})$ $4 \times 81 = 324$ $\frac{144x^4}{4} = \sqrt{36x^4} = 6x^2$ $324x^2 - 144x^4 = (9x - 6x^2)(9x + 6x^2)$	f) $\boxed{?} - 75x^6y = 3y(4 - \boxed{?})(4 + \boxed{?})$ $16 \times 3 = 48$ $48y$ $\sqrt{16} = 4$ $\frac{75x^6}{3} = \sqrt{25x^6} = 5x^3$ $48y - 75x^6y = 3y(4 - 5x^3)(4 + 5x^3)$
g) $45x^6y - \boxed{?} = 5y(\frac{\boxed{?}}{3x^3} - 7y^3z)(\frac{\boxed{?}}{7y^3z} + \frac{\boxed{?}}{7y^3z})$ $45x^6y - 245y^7z^2 = 5y(3x^3 - 7y^3z)(3x^3 + 7y^3z)$	h) $300x^4y^2 - \boxed{?} = 3y^2(\frac{\boxed{?}}{10x^2} - 7z)(\frac{\boxed{?}}{10x^2} + \frac{\boxed{?}}{10x^2})$ $300x^4y^2 - 147y^2z^2 = 3y^2(10x^2 - 7z)(10x^2 + 7z)$

3. Factor each of the following expressions:

a) $9x^2 - 4y^2$ $(3x+2y)(3x-2y)$	b) $81a^2 - 25b^2$ $(9a+5b)(9a-5b)$	c) $16x^2 - 49y^2$ $(4x+7y)(4x-7y)$
d) $\frac{x^2}{16} - \frac{y^2}{49}$ $(\frac{x}{4} + \frac{y}{7})(\frac{x}{4} - \frac{y}{7})$	e) $27x^3 - 12xy^2$ $3x(9x^2 - 4y^2)$ $3x(3x+2y)(3x-2y)$	f) $50a^2b - 98b^3$ $2b(25a^2 - 49b^2)$ $2b(5a-7b)(5a+7b)$
g) $(2x-1)^2 - 9x^2$ $((2x-1+3x)(2x-1-3x))$	h) $(2x-1)^2 - (3x+2)^2$ $((2x-1-3x+2)(2x-1+3x+2))$	i) $(4x+3)^2 - (x+5)^2$ $((4x+3-x+5)(4x+3+x+5))$
j) $4(2x-y)^2 - 25z^2$ $4(2x-y-5z)(2x-y+5z)$	k) $18x^2y^2 - 50y^4$ $2y^2(9x^2 - 25y^2)$ $2y^2(3x-5y)(3x+5y)$	l) $81a^2 - (3a+2b)^2$ $(9a-3a+2b)(9a+3a+2b)$
m) $5x^4 - 80$ $5(x^4 - 16)$ $5(x^2-4)(x^2+4)$	n) $(4x^2-4)^2 - 81x^4$ $4(x^2-1)^2 - 81x^4$ $4(x^2-1-9x^2)(x^2-1+9x^2)$	o) $121x^2 + 36y^2$ $(11x+6y)(11x-6y)$

4. Two concentric circles are overlapping each other as shown in the diagram. Which of the following equations below provides the area between the two circles?



eq #1: $A = (r + R)^2 \times \pi$

eq #2: $A = (r + R)(r - R)\pi$

eq #3: $A = (R + r) \times \pi^2$

eq #4: $A = ((R + r)(R - r) \times \pi) \quad a^2 - b^2 = (a + b)(a - b)$

eq #5: $A = (R^2 + r^2) \times \pi$

5. What is the value of $1000^2 - 999^2 = (\boxed{1000} + \boxed{999})(\boxed{1000} - \boxed{999})$?

$1000 \times 1000 = 1,000,000$

$999 \times 999 = 998,001$

$\boxed{1991}$

$= 1,000,000 - 998,001 = 1991$

6. The difference of two numbers is 20, and the difference of their squares is 800. What is the sum of the two numbers?

$(x + 20)^2 - x^2 = 800$

$x^2 + 20^2 + 40x - x^2 = 800$

$10 + 20 = 30$

$40x = 800 - 400$

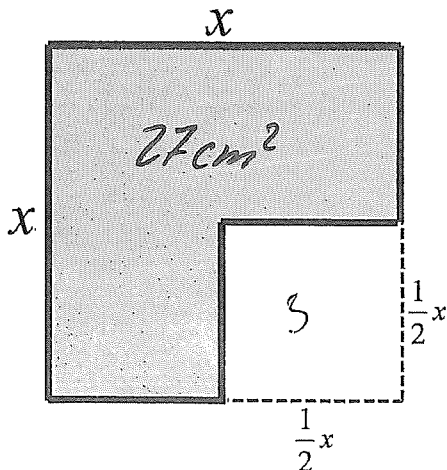
$40x = 400$

$\boxed{x = 10}$

$\boxed{\text{The sum is 40}}$

let x be the smaller number
let $x + 20$ be the bigger number

7. A square with a quarter of it cut out is shown below. If the remaining area is 27cm^2 , then what is the value of " x "?



$\frac{3}{4}a = 27$

$\frac{1}{4}a = 9$

$a = 9 \times 4$

$a = 36\text{cm}^2$

$\sqrt{36} = 6$

Let x be the side length
Let a be the area

$\boxed{\text{The value of } x \text{ is } 6\text{cm}}$

8. The positive difference of two perfect squares is 32. What are the possible values of these two perfect squares?

$$32 = 16 \times 2 \text{ or } 4 \times 8 \quad 6^2 - 2^2 = 36 - 4 = 32$$

$$36 - 4$$

$$x^2 - y^2 = (x-y)(x+y) \quad \begin{matrix} (x-y)=2 \\ 9 \end{matrix} \text{ and } \begin{matrix} (x+y)=16 \\ 9 \end{matrix}$$

$$(x-y)=4 \text{ and } (x+y)=8$$

$$(6-2)=4 \text{ and } (6+2)=8$$

9. What is $1,000,000^2 - 999,999^2$? Do not use a calculator.

$$(1,000,000 - 999,999)(1,000,000 + 999,999)$$

$$= 1 \times 1,999,999 = \boxed{1,999,999}$$

10. The number 2001 can be written as a difference of squares, $x^2 - y^2$ where "x" and "y" are positive integers in four different ways. What are the four possible ways?

$$2001 = 3 \times 667$$

$$(x-y)=3 = (335-332)=3$$

$$(x+y)=667 \quad (335+332)=667$$

$$(x-y)=23 = (26-3)=23$$

$$(x+y)=29 = (26+3)=29$$

$$\begin{aligned} &(1001+1600)(1001-1600) \\ &(49+20)(49-20) \\ &(335+332)(335-332) \\ &(28+3)(28-3) \end{aligned}$$

11. Two numbers are such that their difference, their sum and their product are to one another as 1:7:18. The

product of the two numbers are:

a) 6

b) 12

c) 24

d) 48

e) none of these

$$(a-b)=1$$

$$a+b=7$$

$$ab=18$$

$$a=4$$

$$a, b=2$$

$$a=8$$

$$a-b=1$$

$$a+b=4$$

$$b=6$$

$$ab=6$$

$$\begin{aligned} a-b &= 1 \\ a+b &= 7 \\ ab &= 18 \end{aligned}$$

Let a be bigger #
Let b be smaller #

$$\begin{aligned} a-b &= 1 \\ a+b &= 7 \\ ab &= 18 \end{aligned}$$

12. The number 2005 can be written in the form of $a^2 - b^2$, where "a" and "b" are positive integers less than 1000 in exactly one way. What is the value of $a^2 + b^2$?

$$2005 = 5 \times 401$$

$$(203-198)=5$$

$$(203+198)=401$$

$$(203-198)(203+198)=2005$$

$$(a-b)=5$$

$$(a+b)=401$$

$$2a = 406$$

$$a = 203$$

$$b = 203 - 5 = 198$$

Name: Kiavash BehmaveshDate: NOV. 27, 2025**M8H HW CH2 Lesson 8 Multiplying Polynomials**

1. Simplify each of the following expressions:

a) $3abc(8ab^4c)$ $24a^2b^5c^2$	b) $(-13ab^3c)(-2a^3)(9bc^3)$ $234a^4b^4c^4$	c) $8ab(12-3a+7ac)$ $96ab-24a^2b+56a^2bc$
d) $6abc(2a+4b-7)$ $12a^2bc+24ab^2c-42abc$	e) $12ab^3(1+2a^2b^3-3a)$ $12ab^3+24a^3b^6-36a^2b^3$	f) $2a^2b(15ac^2-bc)$ $30a^3bc^2-2a^2b^2c$
g) $-4a^2b(2a+4bc)$ $-8a^3b-16a^2b^2c$	h) $4abc^3(9a^2-3b^2c)$ $36a^3bc^3-12ab^3c^4$	i) $-3ac(3a^3+4a^2b-12c)$ $-9a^4c-12a^3bc+36ac^2$
j) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4	k) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4	l) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4
m) $\frac{18ab-36a^3b}{9ab}$ $2-4a^2$	n) $\frac{20ab-16b}{4b}$ $5a-4$	o) $\frac{3ab^2-12ab^3}{3ab}$ $b-4b^2$
p) $\frac{3x^2y^2-9xy+12x}{3x}$ xy^2-3y+4	q) $\frac{-24x^3y-16x^2y-12y^3x}{4xy}$ $-6x^2-4x-3y^2$	r) $\frac{-15x^3y^2z-20x^3y+35y^3x^3}{5x^2}$ $-3xy^2z-4xy+7xy^3$

M8H HW CH2 Lesson 10: Factoring and Solving Trinomials

1. Given each pair of binomials, expand and simplify:

$$\begin{aligned} \text{a. } (x-3)(x+4) \\ x^2 + 4x - 3x - 12 \\ \boxed{x^2 + x - 12} \end{aligned}$$

$$\begin{aligned} \text{b. } (x+11)(x-9) \\ x^2 - 9x + 11x - 99 \\ \boxed{x^2 + 2x - 99} \end{aligned}$$

$$\begin{aligned} \text{c. } (2x+3)(3x-1) \\ 6x^2 - 2x + 9x - 3 \\ \boxed{6x^2 + 7x - 3} \end{aligned}$$

$$\begin{aligned} \text{e. } (7x-3)(4x+2) \\ 28x^2 + 14x - 12x - 6 \\ \boxed{28x^2 + 2x - 6} \end{aligned}$$

$$\begin{aligned} \text{f. } (10x-3)(4x-2) \\ 40x^2 - 20x - 12x + 6 \\ \boxed{40x^2 - 32x + 6} \end{aligned}$$

$$\begin{aligned} \text{g. } (8x-3)(3x-8) \\ 24x^2 - 64x - 9x + 24 \\ \boxed{24x^2 - 73x + 24} \end{aligned}$$

2. Given each pair of binomials, solve for "x":

$$\begin{aligned} \text{a. } (x+9)(x+21) &= 0 \\ x+9 &= 0 \rightarrow x = -9 \\ \text{or } x+21 &= 0 \rightarrow x = -21 \\ \boxed{x = -9 \text{ or } -21} \end{aligned}$$

$$\begin{aligned} \text{b. } 4(x-3)(x+3) &= 0 \\ (x-3) &= 0 \rightarrow x = 3 \\ \text{or } (x+3) &= 0 \rightarrow x = -3 \\ \boxed{x = \pm 3} \end{aligned}$$

$$\begin{aligned} \text{c. } (x+81)(x-29) &= 0 \\ x+81 &= 0 \rightarrow x = -81 \\ \text{or } x-29 &= 0 \rightarrow x = 29 \\ \boxed{x = -81 \text{ or } 29} \end{aligned}$$

$$\begin{aligned} \text{e. } (2x-5)\left(x-\frac{1}{2}\right) &= 0 \\ 2x-5 &= 0 \rightarrow 2x=5 \rightarrow x=\frac{5}{2} \\ \text{or } x-\frac{1}{2} &= 0 \rightarrow x=\frac{1}{2} \\ \boxed{x = \frac{5}{2} \text{ or } \frac{1}{2}} \end{aligned}$$

$$\begin{aligned} \text{f. } x(3x+1) &= 0 \\ x &= 0 \\ \text{or } 3x+1 &= 0 \rightarrow 3x=-1 \rightarrow x=-\frac{1}{3} \\ \boxed{x = 0 \text{ or } -\frac{1}{3}} \end{aligned}$$

$$\begin{aligned} \text{g. } 2(5-2x)\left(\frac{1}{3}-x\right) &= 0 \\ (10-4x)\left(\frac{1}{3}-x\right) &= 0 \\ 10-4x &= 0 \rightarrow -4x=-10 \rightarrow x=\frac{10}{4} \\ \text{or } \frac{1}{3}-x &= 0 \rightarrow x=\frac{1}{3} \\ \boxed{x = \frac{1}{3} \text{ or } \frac{5}{2}} \end{aligned}$$

3. Given each expression, find the missing value in the box:

$$\begin{aligned} \text{a. } x^2 - 11x - 12 &= (x - \boxed{?})(x+1) \\ \boxed{(x-12)(x+1)} \end{aligned}$$

$$\begin{aligned} \text{b. } x^2 - 29x + 120 &= (x - \boxed{?})(x-5) \\ -\frac{120}{5} &= -24 \quad \boxed{(x-24)(x-5)} \end{aligned}$$

$$\begin{aligned} \text{c. } 5x^2 + 6x + 1 &= (5x + \boxed{?})(x+1) \\ \frac{1}{5} &= 1 \quad \boxed{(5x+1)(x+1)} \end{aligned}$$

$$\begin{aligned} \text{d. } 2x^2 - 23x + 11 &= (2x - \boxed{?})(x-11) \\ \frac{11}{-11} &= -1 \\ \boxed{(2x-1)(x-11)} \end{aligned}$$

4. Factor each of the following expressions. Show all your steps and work:

a. $x^2 + 7x + 6$

$$\begin{array}{r} \downarrow \quad \downarrow \\ x \quad 6 \\ x \quad 1 \end{array} \quad \times$$

$$(x+1)(x+6)$$

b. $x^2 + 25x + 24$

$$\begin{array}{r} \downarrow \quad \downarrow \\ x \quad 24 \\ x \quad 1 \end{array} \quad \times$$

$$(x+1)(x+24)$$

c. $x^2 + 10x + 21$

$$\begin{array}{r} \downarrow \quad \downarrow \\ x \quad 3 \\ x \quad 7 \end{array} \quad \times$$

$$(x+7)(x+3)$$

d. $x^2 - 10x + 24$

$$\begin{array}{r} \downarrow \quad \downarrow \\ x \quad -6 \\ x \quad -4 \end{array} \quad \times$$

$$(x-4)(x-6)$$

e. $x^2 + 3x - 40$

$$\begin{array}{r} x \quad 8 \\ x \quad -5 \end{array} \quad \times$$

$$(x-5)(x+8)$$

f. $4x^2 + 9x + 2$

$$\begin{array}{r} 4x \quad 2 \\ x \quad 1 \end{array} \quad \times$$

$$(4x+1)(x+2)$$

g. $2x^2 + 5x + 2$

$$\begin{array}{r} 2x \quad 2 \\ x \quad 1 \end{array} \quad \times$$

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

h. $2x^2 - 11x + 15$

$$\begin{array}{r} 2x \quad -3 \\ x \quad -5 \end{array} \quad \times$$

$$(2x-5)(x-3)$$

i. $21x^2 + 17x - 30$

$$\begin{array}{r} 32x \quad -6 = -18 \\ 7x \quad 5 \quad +35 \\ \hline 117 \end{array}$$

$$(3x+5)(7x-6)$$

j. $2x^2 - 7x + 5$

$$\begin{array}{r} 2x \quad -1 \\ x \quad -5 \end{array} \quad \times$$

$$(2x-5)(x-1)$$

k. $5x^2 - 13x - 6$

$$(5x-3)(x-2)$$

l. $7x^2 + 9x - 10$

$$\begin{array}{r} -70 \\ \hline (7x+14)(x-5) \\ (x+2)(7x-5) \end{array}$$

$$(x+2)(7x-5)$$

m. $21 + 26x - 15x^2$

$$(3x+5)(7x-3)$$

n. $2x^2 - 9xy - 45y^2$

$$(2x-15y)(x+3y)$$

o. $5x^4 - 9x^2 - 2$

$$(5x^2+1)(x^2-2)$$

p. $6 - 7x^2 + 2x^4$

$$\begin{array}{r} 2x^4 - 7x^2 + 6 \\ \hline 12 \\ (2x^2-3)(2x^2-4) \\ (2x^2-3)(x^2-2) \end{array}$$

$$(2x^2-3)(x^2-2)$$

5. Factor each of the following expressions and solve for "x". Show all your steps and work:

a. $x^2 + 8x + 12 = 0$

$$(x+6)(x+2) = 0$$

$$(x+2) = 0$$

$$\text{or} \\ (x+6) = 0$$

$$x = -2, -6$$

b. $x^2 + 17x + 72 = 0$

$$(x+8)(x+9) = 0$$

$$x+8 = 0$$

$$\text{or} \\ x+9 = 0$$

$$x = -8, -9$$

c. $x^2 + 2x - 15 = 0$

$$(x-5)(x+3) = 0$$

$$(x-5) = 0$$

$$\text{or} \\ (x+3) = 0$$

$$x = 5, -3$$

d. $x^2 - 7x - 170 = 0$

$$(x-17)(x+10) = 0$$

$$(x-17) = 0$$

$$\text{or} \\ (x+10) = 0$$

$$x = -10, 17$$

$$e. x^2 - 64 = 0$$

$$x^2 = 64$$

$$\sqrt{x^2} = \sqrt{64}$$

$$x = 8$$

$$f. 100 - x^2 = 0$$

$$x^2 = 100$$

$$\sqrt{x^2} = \sqrt{100}$$

$$x = 10$$

$$g. (2x-1)^2 - 16 = 0$$

$$\sqrt{(2x-1)^2} = \sqrt{16}$$

$$2x-1 = 4$$

$$2x = 5$$

$$x = \frac{5}{2}$$

$$h. 2x^2 - 11x + 15 = 0$$

$$(2x-5)(x-3) = 0$$

$$(2x-5) = 0$$

$$(x-3) = 0$$

$$2x = 5$$

$$x = 2.5$$

$$x = 2.5, 3$$

$$i) 13x^2 + 8x - 5 = 0$$

$$(13x-5)(x+1) = 0$$

$$(x+1) = 0$$

or

$$(13x-5) = 0$$

$$13x = 5$$

$$x = \frac{5}{13}, -1$$

$$j) 2x^2 - 25x - 13 = 0$$

$$(2x+1)(x-13) = 0$$

$$(2x+1) = 0$$

$$(x-13) = 0$$

$$x = -\frac{1}{2}, 13$$

$$k) 2x^2 - 7x + 6 = 0$$

$$(2x-3)(x-2) = 0$$

$$(x-2) = 0$$

$$(2x-3) = 0$$

$$x = 2, \frac{3}{2}$$

$$l) 10x^2 + 49x + 49 = 0$$

$$(10x+14)(x+3.5) = 0$$

$$(5x+7)(2x+7) = 0$$

$$(5x+7) = 0$$

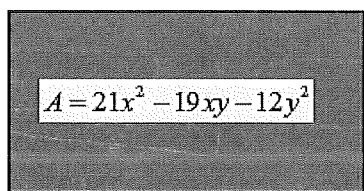
$$(2x+7) = 0$$

$$x = -\frac{7}{5}, -\frac{7}{2}$$

$$x = -\frac{7}{5}, -\frac{7}{2}$$

m) $(x+2)^2 + 8(x+2) - 20 = 0$ $a^2 + 8a - 20 = 0$ $(a-10)(a+2) = 0$ $(a-10) = 0$ $(a+2) = 0$ $a = 10, a = -2$ $x = -4, 8$	n) $(x-3)^2 + 10(x-3) + 9 = 0$ $a^2 + 10a + 9 = 0$ $(a+9)(a+1) = 0$ $(a+9) = 0$ $(a+1) = 0$ $a = -9, -1$ $x = -6, -7$	o) $2(x+1)^2 - (x+1) - 6 = 0$ $2a^2 - a - 6 = 0$ $(2a+3)(a-2) = 0$ $(2a+3) = 0$ $(a-2) = 0$ $a = -\frac{3}{2}, 2$ $x = -\frac{5}{2}, 1$
p) $4(x+2)^2 = 6 - 5(x+2)$ $4a^2 = 6 - 5a$ $4a^2 + 5a - 6 = 0$ $(4a+3)(a-2) = 0$ $(4a+3) = 0$ $(a-2) = 0$ $a = -\frac{3}{4}, 2$ $x = -\frac{5}{4}, \frac{3}{4}$	q) $x^4 = 10 - 9x^2$ $x^4 + 9x^2 - 10 = 0$ $(x^2-1)(x^2+10) = 0$ $(x^2-1) = 0$ $(x^2+10) = 0$ $x^2 = 1, -10$ $x = 1, \sqrt{10}$	
r) $r^4 - 17r^2 + 16 = 0$ $(r^2-16)(r^2-1) = 0$ $(r^2-16) = 0$ $(r^2-1) = 0$ $r^2 = 16, 1$ $r = 4, 1$	s) $x^4 - 29x^2 + 100 = 0$ $(x^2-25)(x^2-4) = 0$ $(x^2-25) = 0$ $(x^2-4) = 0$ $x^2 = 25, 4$ $x = 5, 2$	t) $4(x^2 - 6x + 9)^2 - 12(x^2 - 6x + 9) = -9$ $(4x^2 - 24x + 36)^2 - 12(x^2 - 6x + 9) = -9$ $(4x^2 - 24x + 36) = 3$ $4x^2 - 24x + 36 = 3$ $4x^2 - 24x + 33 = 0$ $(4x-11)(x-3) = 0$ $(4x-11) = 0$ $(x-3) = 0$ $x = \frac{11}{4}, 3$

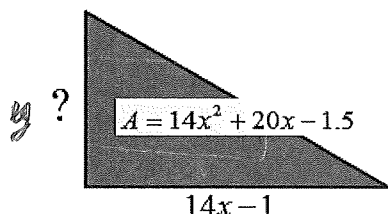
6. The area of a rectangle is given by the expression: $21x^2 - 19xy - 12y^2$ and the width is $7x + 3y$. Find the length of the rectangle:



$$l = \frac{21x^2 - 19xy - 12y^2}{7x + 3y} = \frac{(7x + 3y)(3x - 4y)}{7x + 3y}$$

$$l = 3x - 4y$$

7. The area of a triangle is given by the expression: $14x^2 + 20x - 1.5$ and the width is $14x - 1$. Find the length of the rectangle:



$$\frac{y(14x-1)}{2} = 14x^2 + 20x - \frac{3}{2} \quad \begin{matrix} (28x-4)(28x+2) \\ (2x-3)(14x+1) \end{matrix}$$

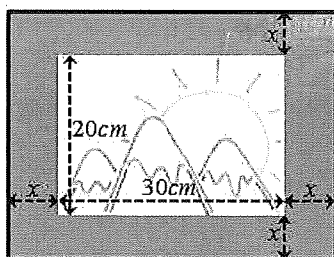
$$y(14x-1) = 28x^2 + 40x - 3$$

$$y(14x-1) = (2x+3)(14x-1)$$

$$y = 2x + 3$$

The length is $2x + 3$

8. A photograph that is 20cm by 30cm is framed with a uniform mat board as shown below. If the area of the photo with the mat is 999cm^2 , then what is the width of the mat?



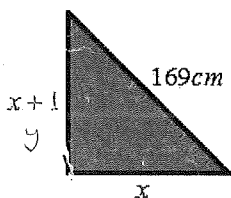
$$20 + 2x = \frac{999}{30 + 2x}$$

$$20 + 2x = w$$

$$w \times (w + 10) = 999$$

$$w^2 + 10w - 999 = 0$$

9. Find the length of the base for the following triangle:



$$x^2 + (x+1)^2 = 169^2$$

$$x^2 + x^2 + 2x + 1 = 169^2$$

$$2x^2 + 2x + 1 = 169^2$$

M8H HW Ch2 Lesson 11: Solving Problems Involving Factoring:

1. Factor and solve all the equations below:

i) $x^2 + 8x + 15 = 0$ $(x+5)(x+3) = 0$ $x = (-5), (-3)$	ii) $x^2 - 7x + 12 = 0$ $(x-4)(x-3) = 0$ $x = 4, 3$	iii) $x^2 - x - 20 = 0$ $(x-5)(x+4) = 0$ $x = 5, (-4)$
iv) $x^2 - 10x + 24 = 0$ $(x-6)(x-4) = 0$ $x = 6, 4$	v) $x^2 + 15x + 56 = 0$ $(x+7)(x+8) = 0$ $x = (-7), (-8)$	vi) $x^2 - x - 42 = 0$ $(x-7)(x+6) = 0$ $x = 7, (-6)$
vii) $x^2 - 9x + 25 = 5$ $x^2 - 9x + 20 = 0$ $(x-4)(x-5) = 0$ $x = 4, 5$	viii) $x^2 - 16x + 50 = -13$ $x^2 - 16x + 63 = 0$ $(x-9)(x-7) = 0$ $x = 9, 7$	ix) $x^2 - 6x - 20 = -4$ $x^2 - 6x - 16 = 0$ $(x-8)(x+2) = 0$ $x = 8, (-2)$
x) $x^2 - 5x + 16 = 3x$ $x^2 - 8x + 16 = 0$ $(x-4)^2 = 0$ $x = 4$	xi) $x^2 - 10x + 16 = 4 - 2x$ $x^2 - 4 + 2x - 10x + 16 = 0$ $x^2 - 8x + 12 = 0$ $(x-6)(x-2) = 0$ $x = 6, 2$	xii) $x^2 - 8x - 40 = 4 - x$ $x^2 - 7x - 44 = 0$ $(x-11)(x+4) = 0$ $x = 11, (-4)$
xiii) $2x^2 - 72 = 0$ $2x^2 = 72$ $x^2 = 36$ $x = \pm\sqrt{36}$ $x = \pm 6$	ixx) $9x^2 - 100 = 0$ $(3x-10)(3x+10) = 0$ $x = \frac{10}{3}, (-\frac{10}{3})$	xx) $32x^2 - 242 = 0$ $x^2 = \frac{242}{32}$ $x^2 = \frac{121}{16}$ $x = \pm\sqrt{\frac{11}{4}}$ $x = \pm\frac{11}{4}$

2. What is the sum of the two numbers that satisfy the equation: $x^2 - 6x - 7 = 0$

$$(x-7)(x+1) = 0 \quad 7 + (-1) = 7 - 1 = 6$$

$$x = 7, (-1)$$

$$\boxed{6}$$

3. Determine all real numbers "x" such that $(x+3)(x-6) = -14$

$$x^2 - 3x - 18 = -14$$

$$x^2 - 3x - 4 = 0$$

$$(x-4)(x+1) = 0$$

$$x = 4, -1$$

$$(-1) \text{ \& } 4$$

4. What is the product of the two numbers that satisfy the equation: $5x^2 - 20 = 0$

$$5x^2 = 20$$

$$x^2 = 4$$

$$x = \pm 2$$

$$(-2)(2) = -4$$

$$-4$$

5. Determine the average of the numbers that satisfy the equation: $x^3 - 6x^2 + 5x = 0$

$$x(x^2 - 6x + 5) = 0$$

$$x(x-5)(x-1) = 0$$

$$x = 0, 5, 1$$

$$\frac{5+1}{2} = 2$$

$$2$$

6. Determine all real numbers "x" such that: $2^{2x} - 3(2^x) - 4 = 0$

$$\text{let } y = 2^x \quad y^2 - 3y - 4 = 0$$

$$(y-4)(y+1) = 0$$

$$4, -1 \quad 2^x = 4$$

$$x = 2$$

7. Determine all real numbers "x" such that: $(x^2 - 3x)^2 = 4 - 3(3x - x^2)$

$$x^4 - 6x^3 + 9x^2 = 4 - 9x + 3x^2 \quad (x^2 - 3x - 2)(x-2)(x-1) = 0$$

$$x^4 - 6x^3 + 6x^2 - 4 = 0$$

$$x = 2, 1, 2, 2$$

$$(x^2 - 3x - 2)(x^2 - 3x + 2) = 0$$

8. If $x^2 - x - 2 = 0$, determine all possible values of: $1 - \frac{1}{x} - \frac{6}{x^2}$

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

$$1 - \frac{1}{2} - \frac{6}{4} = 4 - 2 - 6 = -4$$

$$x = 2, -1$$

$$1 - \frac{1}{-1} - \frac{6}{1} = 1 + 1 - 6 = -4$$

$$-4$$

9. Determine all the possible values of "k" so that the expression can be factored: $x^2 + kx - 24 = 0$

-24

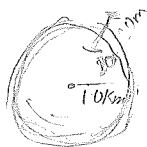
73	-1	24	-4	6	2
-23	1	-24	4	-6	-2
10	-2	12			
-10	2	-12			
5	-3	8			
-5	3	-8			

$$K = 23, (-23), 10, (-10), 5, (-5), 2, (-2)$$

10. Two numbers differ by 6. The sum of their squares is 90. Find the numbers.

$$\begin{aligned} x - y &= 6 \\ x^2 + y^2 &= 90 \\ x^2 + y^2 &= 36 \\ 2x^2 &= 126 \\ x^2 &= 63 \\ x &= \pm\sqrt{63} \\ x &\approx \pm 7.9 \end{aligned}$$

11. A man runs around the circumference of a circle with a radius of 10km. If he can see 20meters in either direction, what is the area of all the land that he can see?



$$\begin{aligned} &\pi(x-20)^2 - \pi(x+20)^2 \\ &\pi((x-20)^2 - (x+20)^2) \\ &\pi(x-20+x+20)(x+20-x-20) \\ &\pi(2x)(40) \\ &\pi 80x \\ &\pi 800 \end{aligned}$$

$$x = 10 \text{ km/radius of circle}$$

$$\begin{aligned} 800\pi &= \times 3.14 \\ &\underline{3200} \\ &800 \\ &\underline{2400} \\ &251200 \end{aligned}$$

$$2512 \text{ km}^2$$

12. The sum of the first "N" terms of the series: $1 + 2 + 3 + 4 + \dots + N$ is given by the formula: $S = N(N+1)$.

What is the sum of the first 20 terms? B) How many terms are there if the sum is 110?

$$\begin{aligned} a) S &= 20(21) = \frac{21}{20} = 420 \\ &\underline{00} \\ &42 \\ &\underline{420} \end{aligned}$$

$$\begin{aligned} B) N(N+1) &= 110 \\ N^2 + N &= 110 \\ N^2 + N - 110 &= 0 \\ (N+11)(N-10) &= 0 \end{aligned}$$

$$N = (-11), (10) \text{ but we can't have } -11 \text{ so } 10$$

13. If $ax^3 + bx^2 + cx + d = (x^2 + x - 2)(x - 4) - (x + 2)(x^2 - 5x + 4)$ for all values of "x". What is the value of

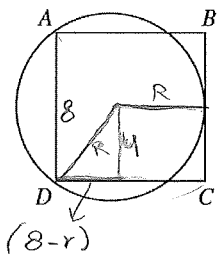
$$a + b + c + d? \quad (x-1)(x+2)(x+1) - (x+2)(x-4)(x-1)$$

$$ax^3 + bx^2 + cx + d = 0$$

they could all be zeros

14. Each side of a square ABCD is 8. A circle is drawn through "A" and "D" so that it is tangent to BC. What is the radius of the circle?

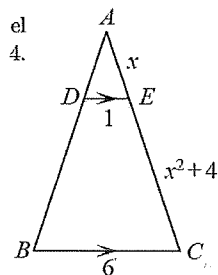
Let r represent the radius of the circle



$$\begin{aligned}(8-r)^2 + (4)^2 &= r^2 \\ 64 - 16r + r^2 + 16 &= r^2 \\ -16r + 80 &= 0 \\ -16r &= -80 \\ r &= 5\end{aligned}$$

The radius is 5

15. In the diagram, "D" is on AB and "E" is on AC with DE parallel to BC. Also $DE=1$, $BC=6$, $AE=x$, and $EC=x^2+4$. Determine all possible values of "x"



$$\frac{1}{6} = \frac{x}{x^2 + x + 4}$$

$$x = 4, 1$$

$$6x = x^2 + x + 4$$

$$x^2 + x + 4 = 6x$$

$$x^2 - 5x + 4 = 0$$

$$(x-4)(x-1) = 0$$

16. Find all the integer values of "x" that makes this inequality true: $(x-4)(x+4) \leq 0$

$$x^2 - 16 < 0$$

$$x^2 < 16$$

$$-4 < x < 4$$

$$x = (-3), (-2), (-1), 0, 1, 2, 3$$

17. Challenge: Find all the integer values of "x" that make this equation true? $(x^2 + 12x + 36)^{(x^2 + 6x + 8)} = 1$

$$x^2 + 6x + 8 = 0$$

$$(x+4)(x+2) = 0$$

$$x = (-4), (-2)$$

$$x^2 + 12x + 36 = 1$$

$$(x+5)(x+7) = 0$$

$$x = (-5), (-7)$$

$$x = (-4), (-2), (-5), (-7)$$