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Duotang/Notes/Homework

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M8 - Methods

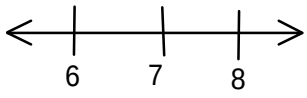
BEDMAS
Integers (side by side and × & ÷)
Same Plus: Two signs side by side that are the SAME equal a POSITIVE number.

$+(+4) = -(-4)$
$+4 = +4$

Different Minus: Two signs side by side that are DIFFERENT equal a NEGATIVE number.

$+(-4) = -(+4)$
$-4 = -4$

Adding Subtracting: Number-line



$*-2-2 \neq 4 = -4$

Equivalent/Fractions
Do to top/Do to bottom
Multiply tops/bottoms
Flip and Multiply
LCD

Scale
Multiply/divide by the scale factor

$$Scale\ Factor = \frac{Larger\ \#}{Smaller\ \#}$$

Percentages, Fractions, Decimals:

$$\frac{Part}{Total} = Decimal$$

$$Part = Decimal \times Total$$

$Decimal \times 100 = \%$ $(decimal\ two\ to\ right)$
$\% \div 100 = Decimal$ $(decimal\ two\ to\ left)$

$0.1 = \frac{1}{10}$ $0.\overline{3} = \frac{3}{9}$
$0.23 = \frac{23}{100}$ $0.\overline{45} = \frac{45}{99}$
$0.045 = \frac{45}{1000}$

1%

Equations:
Golden Rule: Do to the Left/Do to the Right
Adding Subtracting both sides
Multiplying Dividing both side
Like Terms
Square Root both sides
Expressions/Equations 1 Variable
Multiply by the LCD, Do to one Do to all.
Subtract the smaller coefficient of x from both sides or add the more negative.

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

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

$$a = b$$
$$b = a$$

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

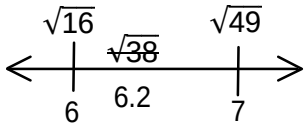
Substitution:
$a = 2$
$3a = ?$
$3(2) = 6$ Put 2 in for "a" with brackets

Distribution :
$2(x + 4) = 2x + 8$

Geometry:
Pythagorean Relationship
$a^2 + b^2 = c^2$
Perimeter, Area, Volume
Net Surface Area: Lay Shape Flat
Formulas

Square Roots
$\sqrt{4} = \sqrt{2 \times 2} = 2$

Estimating Squares/Square Roots



Probability

$$Probability = \frac{number\ of\ favorable\ outcomes}{total\ outcomes}$$

Methods :
Table
Tree: Multiply Branches=Cells
Add Leaves/Cells

M8 - Remember

Integers $* -2 - 2 \neq 4$

Same Plus	Different Minus
$+ \times + = +$	$+ \times - = -$
$- \times - = +$	$- \times + = -$
$+ \div + = +$	$+ \div - = -$
$- \div - = +$	$- \div + = -$

$\frac{is}{of}$ $\quad What\ is\ 20\%\ of\ 50.$

$.20 \times 50 = 10$

$15\%\ fewer\ doesn't\ mean\ 0.15p$
$it\ means\ (1 - 0.15)p\ or\ 0.85p$

Fractions

Every Number is Over "1."

$-\frac{2}{3} = \frac{-2}{3} = \frac{2}{-3} \neq \frac{-2}{-3}$ $\qquad \frac{-2}{-3} = \frac{2}{3}$

$\frac{x}{2} = \frac{1x}{2} = \frac{1}{2}x = \frac{1}{2} \times x$ $\qquad \frac{1}{2x} \neq \frac{1}{2}x$

$\frac{\mathbf{1}}{\mathbf{3}} + \frac{\mathbf{1}}{\mathbf{5}} \neq \frac{\mathbf{1}}{\mathbf{3+5}}$ $\qquad \frac{\mathbf{3}}{\mathbf{2+1}} \neq \frac{\mathbf{3}}{\mathbf{2}} + \frac{\mathbf{3}}{\mathbf{1}}$

$\frac{\mathbf{1+2}}{\mathbf{3+2}} \neq \frac{\mathbf{1}}{\mathbf{3}} + \mathbf{1}$

Equations

$x + x = 2x$
$x \times x = x^2$

$2(3) = 2 \times 3 = 6$

$-x = -1x$
$3 = 3^1$
$1 \times x = 1x = x = x^1$
$2 \times x = 2(x) = 2x = x2$
$x^2 = 1x^2$
$5 = 5x^0$

Factor trees:

Regardless of how you make the factor tree, you will always end up with the same prime factors

Pythagoras :

"c" is always the hypotenuse, the longest side
Bigger square − Smaller square = Other smaller square.

Square Roots (Radicals)

$3 \times 3 = 9$ $\qquad \sqrt{9} = 3$
$5 \times 5 = 25$ $\qquad \sqrt{25} = 5$

Can't square root a negative

$\sqrt{-9} = undefined$

The area of a square with side lengths 3 is 9.
The square root of 9 is 3.

Geometry

Adjacent sides of net areas are the same length
The width of rectangle in the cylinders net area is the circumference of the circle

$V = (area\ of\ base) \times height$

*Base must be identical to Top

Exponent :

Do not multiply the base by the exponent!

Probability :

$And = multiply$
$Or = add$

Common Mistakes

$\frac{a}{b+c} \neq \frac{a}{b} + \frac{a}{c}$ $\qquad \frac{a+b}{c} = \frac{a}{c} + \frac{b}{c}$

Algebra

$a + 1 = a + 1$ Can't add or subtract unlike terms.

Can only add or subtract like terms.

Linear Equations

Table of Values TOV
$x - intercept: y = 0,$
$put\ 0\ in\ for\ y\ and\ solve.\ (x, 0)$
$y - intercept: x = 0,$
$put\ 0\ in\ for\ x\ and\ solve.\ (0, y)$

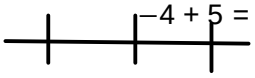
Two signs side by side $\qquad$ *Multiplication And Division of Positive and Negative Numbers*

$4 - (-5) =$
$4 + 5 = 9$ $\qquad -4 \times -5 = +20$

Same Plus
Different Minus

Adding And Subtraction

$-4 + 5 = 1$



Number Line

M8 - Div Zero/Negative

$\frac{8}{2} = 4$ $\quad 2 \times 4 = 8$

How many times does two go into eight?
Two times what is eight?

$\frac{0}{8} = 0$ $\quad 8 \times 0 = 0$

$\frac{0}{\#} = 0$ $\quad \frac{0}{x} = 0$

How many times does eight go into zero?
Eight times what is zero?
<u>Zero divided anything is zero.</u>

$\frac{8}{0} =$ ____ $\quad$ ____ $\times 0 = 8$

$\frac{8}{0} \neq 0$ $\quad 0 \times 0 \neq 8$

How many times to zero go into eight?
8÷0 is not equal to zero because 0×0 is not equal to 8.
What times zero equals eight?

$\frac{8}{0} = und$ $\quad \frac{x}{0} =$ und

Any number divided by zero is <u>undefined</u> because we don't have the definition for the answer!

$-x = 5$
$+x \quad +x$ $\quad$ *Add x to both sides*
$0 = 5 + x$
$-5 \quad -5$ $\quad$ *Subtract five from both sid*
$-5 = x$
$x = -5$

OR

$-x = 5$
$-1x = 5$ $\quad$ *Negative x is equal to negative 1*
$\frac{-1x}{-1} = \frac{5}{-1}$ $\quad$ *Divide both sides by* -1
$x = -5$

M8 - Cross Multiplication

Cross - Multiply

$\frac{6}{3} = 2$

$3 \times \frac{6}{3} = 2 \times 3$ Times both sides by 3

$6 = 2 \times 3$

$\frac{6}{2} = \frac{2 \times 3}{2}$ Divide both sides by 2

$\frac{6}{2} = 3$

OR

$\frac{6}{3} = 2$

Switch 2 and 3

$\frac{6}{2} = 3$

OR

$\frac{6}{3} = 2$

$6 = 2 \times 3$

$\frac{6}{2} = 3$

Instead of multiplying both sides by three just bringing the three up across and multiplying.

$\frac{d}{t} = v$

$d = vt$

$\frac{d}{v} = t$

M8 - 2.0 - Equivalent Fractions Review

Expanding Ratios/Fractions

$\frac{1}{2} = \frac{2}{4}$ (× 2 above, × 2 below)

Multiply top by 2, must multiply bottom by 2

$\frac{1}{2} = \frac{2}{4}$ (× 2 above, ÷ 2 below)

Multiply in one direction, must divide in other

× 2 (1: 2, 2: 4) × 2

Multiply left by 2, multiply right by 2

Simplifying Ratios/Fractions

$\frac{5}{20} = \frac{1}{4}$ (÷ 5 above, ÷ 5 below)

Divide top by 5, must divide bottom by 5

÷ 5 (5: 20, 1: 4) ÷ 5

Divide left by 5, divide right by 5

Equivalent Fractions

$\frac{3}{5} = \frac{x}{12}$ (× 2.4 above, × 2.4 below)

Multiply bottom by 2.4, must multiply top by 2.4

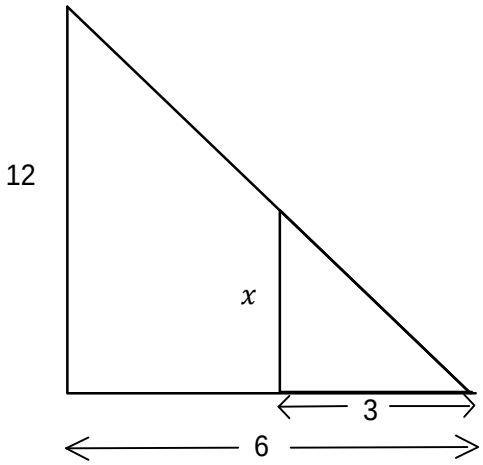
$\frac{12}{5} = 2.4$

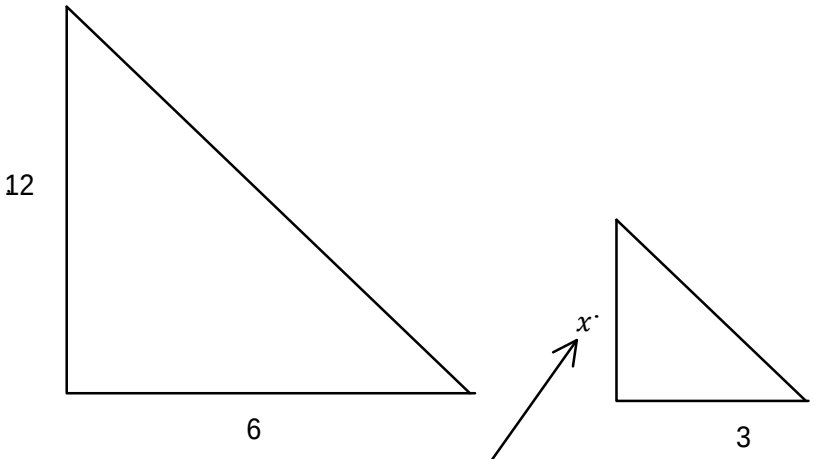
$\frac{3}{5} = \frac{7.2}{12}$ (× 2.4 above, ÷ 2.4 below) $x = 7.2$

Multiply bottom by 2.4, must multiply top by 2.4

If you multiply one direction, divide in the other direction

M8 - 2.0 - Triangles Equivalent Fractions Review





$\frac{12}{6} = \frac{x}{3}$ (÷ 2 / × 2)

$12 \div 2 = 6$

$x = 6$

$\boxed{\frac{12}{6} = \frac{x}{3}}$ $\quad \frac{a}{b} = \frac{x}{c}$

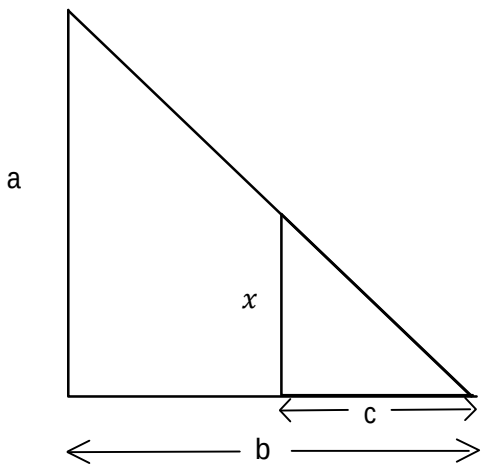
$\frac{x}{12} = \frac{3}{6}$

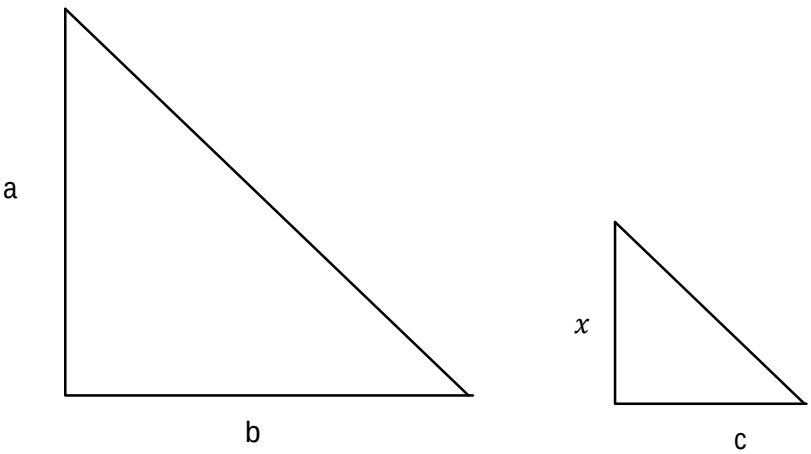
$12 \times \frac{x}{12} = \frac{3}{6} \times 12$

$x = \frac{36}{6}$

$x = 6$

$\boxed{\frac{x}{12} = \frac{3}{6}}$ $\quad \frac{x}{a} = \frac{c}{b}$

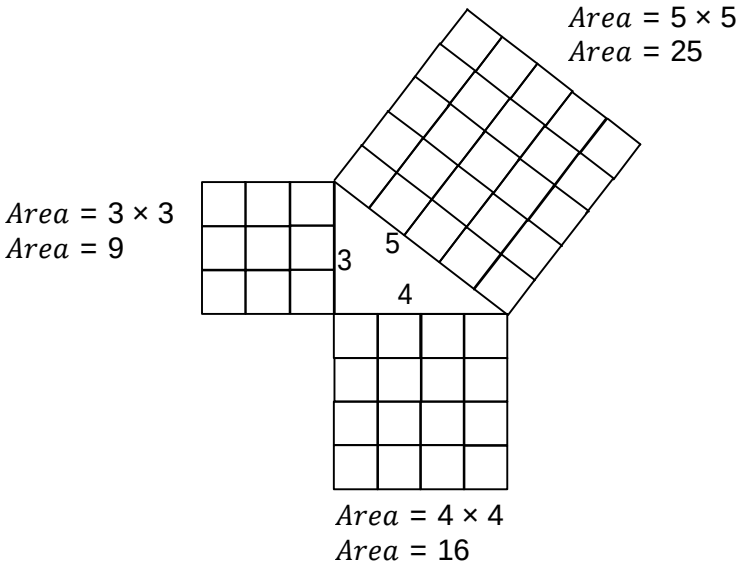


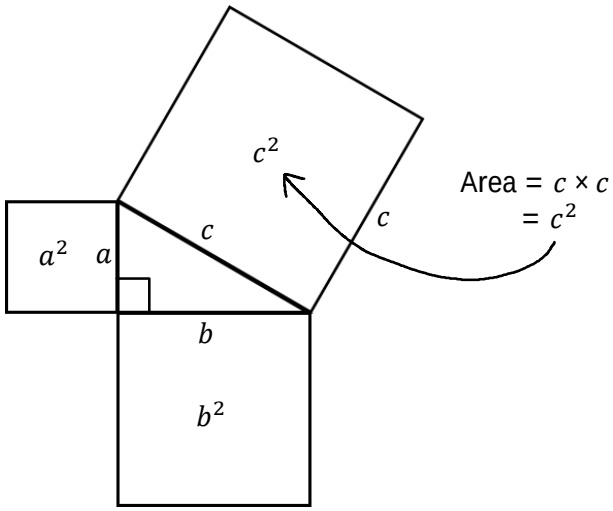


M8 - 3.0 - Pythagoras' Theorem Review

Pythagoras' Theorem: $a^2 + b^2 = c^2$

Remember: "c" is always the Hypotenuse: the longest side

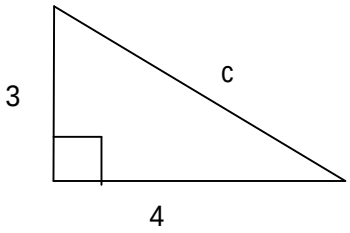




9 $squares$ + 16 $squares$ = 25 $squares$

$\sqrt{25} = 5$

Solve for "c".



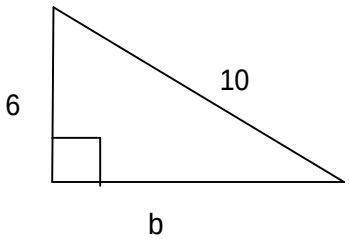
$a^2 + b^2 = c^2$
$3^2 + 4^2 = c^2$
$9 + 16 = c^2$
$25 = c^2$
$\sqrt{25} = \sqrt{c^2}$
$5 = c$

Remember:

The Area of the two small squares adds to the area of the large square.

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

Solve for "a" or "b".



$a^2 + b^2 = c^2$
$6^2 + b^2 = 10^2$
$36 + b^2 = 100$
$-36 \quad -36$
$b^2 = 64$
$\sqrt{b^2} = \sqrt{64}$
$b = 8$

OR

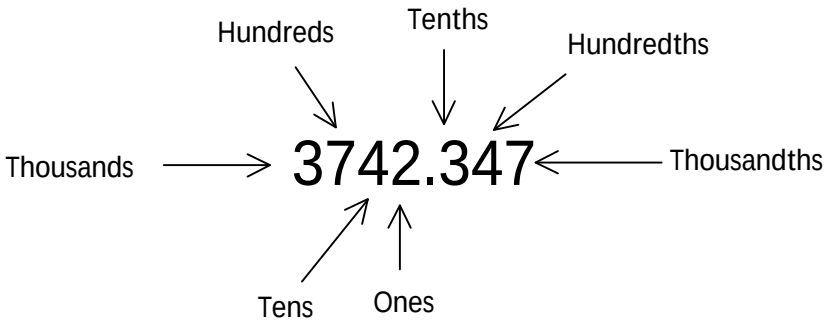
Remember:

Bigger square minus smaller square equals other smaller square.

$c^2 - a^2 = b^2$
$10^2 - 6^2 = b^2$
$100 - 36 = b^2$
$64 = b^2$
$\sqrt{64} = \sqrt{b^2}$
$b = 8$

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

M8 - 4.0 - Decimals/Fractions/Percentages Review



$3742.347 = 3000 + 700 + 40 + 2 + 0.3 + 0.04 + 0.007$

Decimals

$0.1 = \frac{1}{10}$	$0.2 = \frac{2}{10}$	$\frac{Tenths}{10}$
$0.23 = \frac{23}{100}$	$0.48 = \frac{48}{100}$	$\frac{Hundredths}{100}$
$0.457 = \frac{457}{1000}$	$0.068 = \frac{68}{1000}$	$\frac{Thousandths}{1000}$

Repeating decimals

$0.\overline{3} = \frac{3}{9}$	$0.\overline{6} = \frac{6}{9}$	$\frac{\overline{Tenths}}{9}$
$0.\overline{45} = \frac{45}{99}$	$0.\overline{03} = \frac{3}{99}$	$\frac{\overline{Hundredths}}{99}$
$0.\overline{231} = \frac{231}{999}$	$0.\overline{202} = \frac{202}{999}$	$\frac{\overline{Thousandths}}{999}$

Percentages

$\times 100$ → Move decimal 2 places to the right.

$1.00 = 100.\%$

Move decimal 2 places to the left. ←

$\div 100$

$0.42 = 42\%$ $0.50 = 50\%$

$2.24 = 224\%$ $0.065 = 6.5\%$

$\% = decimal \times 100$

$decimal = \frac{\%}{100}$

A percentage is the top of a fraction over 100.

$\frac{is}{of}$

Bottom goes into top.

bottom ⟌ top

M8 - 4.0 - Fractions Decimals % Table

Fractions	Decimals	%
$\frac{1}{10}$	.1	100%
$\frac{3}{10}$	0.3	30%
$\frac{7}{10}$	0.7	70%
$\frac{9}{10}$	0.9	90%

Fractions	Decimals	%
$\frac{1}{2} = \frac{5}{10}$	0.50	50%
$\frac{1}{3} = \frac{3}{9}$	$0.\overline{3}$	$33.\overline{3}\%$
$\frac{1}{4} = \frac{25}{100}$	0.25	25%
$\frac{1}{5} = \frac{2}{10}$	0.20	20%
$\frac{1}{6}$	$0.1\overline{6}$	$16.\overline{6}\%$
$\frac{1}{7}$	0.14	14.29%
$\frac{1}{8}$	0.13	12.5%

Fractions	Decimals	%
$\frac{2}{3} = \frac{6}{9}$	$0.\overline{6}$	$66.\overline{6}\%$
$\frac{2}{5} = \frac{4}{10}$	0.40	40%
$\frac{2}{7}$	0.29	28.57%

Fractions	Decimals	%
$\frac{3}{4} = \frac{75}{100}$	0.75	75%
$\frac{3}{5} = \frac{6}{10}$	0.60	60%
$\frac{3}{7}$	0.43	42.86%
$\frac{3}{8}$	0.38	37.5%

Fractions	Decimals	%
$\frac{4}{5} = \frac{8}{10}$	0.80	80%
$\frac{4}{7}$	0.57	57.14%

Fractions	Decimals	%
$\frac{5}{6}$	$0.8\overline{3}$	$83.\overline{3}\%$
$\frac{5}{7}$	0.71	71.43%
$\frac{5}{8}$	0.63	62.5%

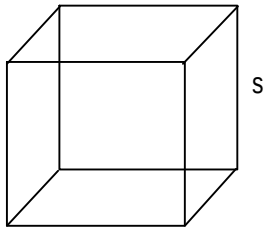
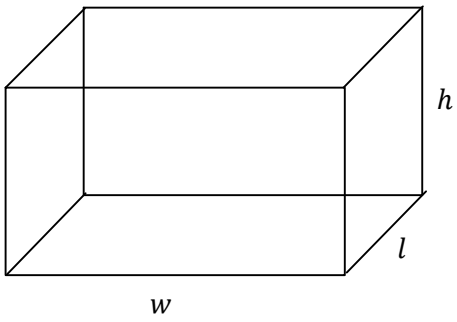
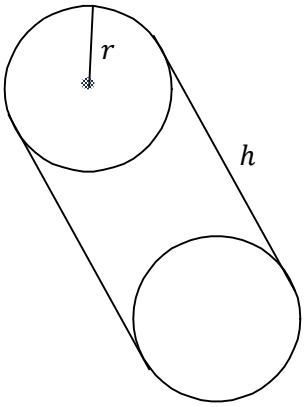
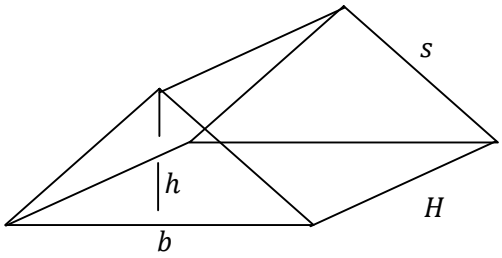
Fractions	Decimals	%
$\frac{6}{7}$	0.86	85.71%

Fractions	Decimals	%
$\frac{7}{8}$	0.88	87.5%

Fractions	Decimals	%
$\frac{1}{9}$	$.\overline{1}$	$11.\overline{1}\%$
$\frac{2}{9}$	$0.\overline{2}$	$22.\overline{2}\%$
$\frac{4}{9}$	$0.\overline{4}$	$44.\overline{4}\%$
$\frac{5}{9}$	$0.\overline{5}$	$55.\overline{5}\%$
$\frac{7}{9}$	$0.\overline{7}$	$77.\overline{7}\%$
$\frac{8}{9}$	$0.\overline{8}$	$88.\overline{8}\%$

Fractions	Decimals	%
$\frac{22}{7}$	3.14	31.42%

M8 - 5.0/7.0 - SA/V of Cube/Rect/Cylinder/Triangular Prism Review

Shape	**Surface Area**	**Volume**
Cube 	$SA = s^2 \times 6$	$V = Area_{base} \times height$ $V = lwh$
Rectangular Prism 	$SA = 2(lw + lh + wh)$	$V = Area_{base} \times height$ $V = lwh$
Cylinder 	$SA = 2\pi r^2 + 2\pi rh$ The circumference of the circle in a cylinder is the width of the rectangle.	$V = Area_{base} \times height$ $V = \pi r^2 h$
Triangular Prism 	Lay flat and add up all areas	$V = Area_{base} \times height$ $V = \frac{bh}{2} \times H$

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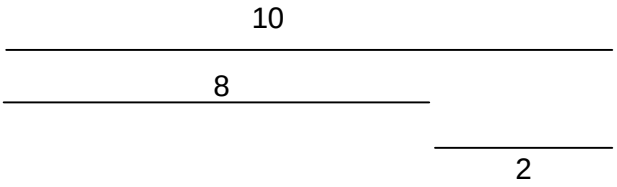
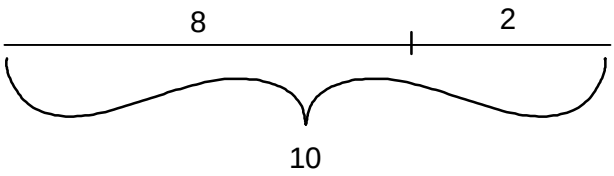
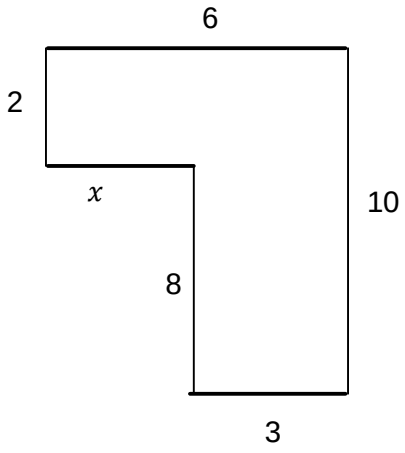
M8 - 5.0 - Breaking up a Line Notes





8 + 2 = 10

Find x.



$x + 3 = 6$
$-3 \quad -3$
$x = 3$

M8 - 6.0 - Fraction Operations Review

Simplification

$\frac{2}{4} =$

$\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$ Divide the top and bottom

Multiplying Fractions

$\frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$ Multiply tops
Multiply bottoms

Dividing Fractions

$\frac{1}{4} \div \frac{2}{3} = \frac{1}{4} \times \frac{3}{2} = \frac{3}{8}$ Flip second fraction and multiply

Adding Fractions

$\frac{2}{3} + \frac{1}{4} = \frac{2 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$

$LCD = 12$
Multiply top and bottom of first fraction by 4
Multiply top and bottom of second fraction by 3
Add numerators

Subtracting Fractions

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

$LCD = 6$
Multiply top and bottom of first fraction by 2
Subtract numerators

Mixed numbers to Improper Fractions

$2\frac{3}{5} = \frac{bottom \times left + top}{bottom}$

$= \frac{5 \times 2 + 3}{5} = \frac{13}{5}$

Multiply the bottom by the left and add the top (this number goes in the numerator of the improper fraction)

Improper Fractions to Mixed numbers

$\frac{13}{4} = 3\frac{1}{4}$

Bottom goes into top 3 times (this number goes in front of the fraction)

Remainder goes in the numerator

M8 - 6.0 - Fractions Algebra Theory

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

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

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

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

$$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

$$a \div \frac{b}{c} = a \times \frac{c}{b} = \frac{ac}{b}$$

$$\frac{a}{\left(\frac{b}{c}\right)} = a \div \frac{b}{c} = a \times \frac{c}{b} = \frac{ac}{b}$$

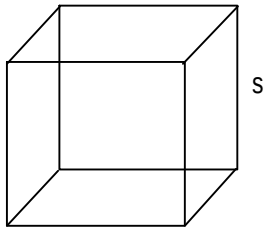
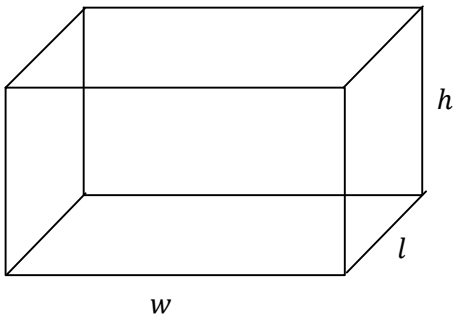
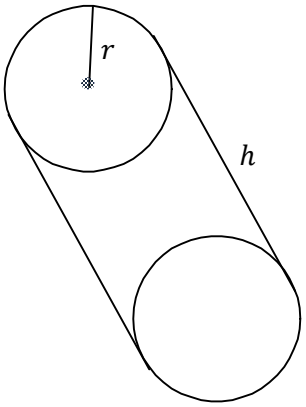
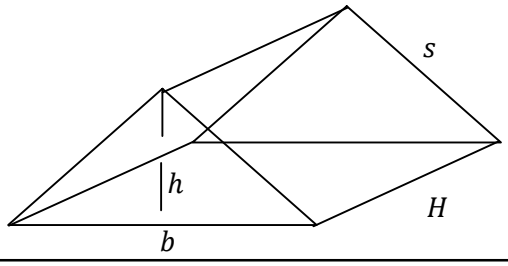
$$\frac{a}{b} \div c = \frac{a}{b} \times \frac{1}{c} = \frac{a}{bc}$$

$$\frac{\left(\frac{a}{b}\right)}{c} = \frac{a}{b} \div c = \frac{a}{b} \times \frac{1}{c} = \frac{a}{bc}$$

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

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + cb}{bd}$$

M8 - 5.0/7.0 - SA/V of Cube/Rect/Cylinder/Triangular Prism Review

Shape	**Surface Area**	**Volume**
Cube  	$SA = s^2 \times 6$	$V = Area_{base} \times height$ $V = lwh$
Rectangular Prism  	$SA = 2(lw + lh + wh)$	$V = Area_{base} \times height$ $V = lwh$
Cylinder  	$SA = 2\pi r^2 + 2\pi rh$ The circumference of the circle in a cylinder is the width of the rectangle.	$V = Area_{base} \times height$ $V = \pi r^2 h$
Triangular Prism  	Lay flat and add up all areas	$V = Area_{base} \times height$ $V = \frac{bh}{2} \times H$

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BEDMAS

$+$ $-$

$\times$ $\div$

3^2 $\sqrt{9}$

$=$ $\neq$

M8 - 9.0 - Graphing Review

WATCH OUT FOR INCREMENTS ON GRAPHs

Graphing linear relations

Table of values method:

x	y
0	
1	
2	
3	
4	

$y = mx + b$

x	y
-2	
-1	
0	
1	
2	

Intercept method:

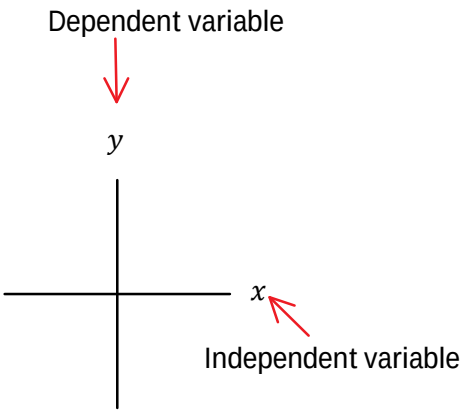
$ax + by = c$

$ax + by + c = 0$

x	y
0	
	0

Finding y-intercept $(0, y)$: Set $x = 0$, Solve for y

Finding x-intercept $(x, 0)$: Set $y = 0$, Solve for x



Independent variable Dependent variable

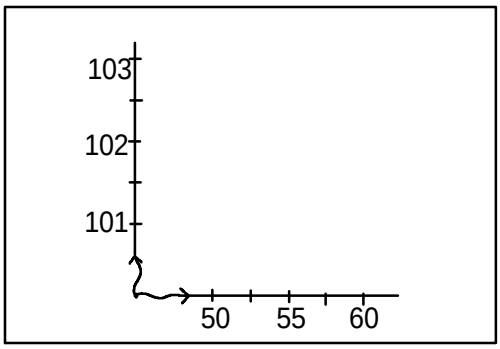
x	**y**
−4	
−2	
0	
2	
4	

y *depends on* x.

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

Make the increments of x, away from 0, in the table of values, the denominator of x in the equation.

	x	**y**
2	**−4**	
2	**−2**	
2	**0**	
2	**2**	
	4	



OPPOSITE BOTH SIDES

Notes

M8 - 10.0 - Solving Linear Equations Review

1. $a + 1 = 2$

$a + 1 = 2$
$-1 \quad -1$ Subtract 1 from both sides

$a + \cancel{1} = 2$
$\cancel{-1} \quad -1$ $+1 - 1 = 0$. Cross it off.

$a = 1$

---

2. $a - 1 = 2$

$a - 1 = 2$
$+1 \quad +1$ Add 1 to both sides

$a - \cancel{1} = 2$
$\cancel{+1} \quad +1$ $-1 + 1 = 0$. Cross it off.

$a = 3$

---

3. $2a = 4$

$\frac{2a}{2} = \frac{4}{2}$ Divide both sides by the number in front of the letter.

$\frac{\cancel{2}a}{\cancel{2}} = \frac{4}{2}$ $\frac{2}{2} = 1$. Cross it off.

$a = 2$

---

4. $\frac{a}{2} = 3$

$2 \times \frac{a}{2} = 3 \times 2$ Multiply both sides by the number below the letter.

$\cancel{2} \times \frac{a}{\cancel{2}} = 3 \times 2$ $\frac{2}{2} = 1$. Cross it off.

$a = 6$

---

5. $\frac{2}{a} = 1$

$a \times \frac{2}{a} = 1 \times a$ Multiply both sides by a.

$\cancel{a} \times \frac{2}{\cancel{a}} = 1 \times a$ $\frac{a}{a} = 1$. Cross it off.

$2 = a$

---

6. $x^2 = 25$

$\sqrt{x^2} = \sqrt{25}$ Square root both sides.

$x = 5$

M8 - 10.0 - Solving Linear Equations Review

1. $a + 1 = 2$

$a + 1 = 2$
$-1 \quad -1$

Subtract 1 from both sides

$a + 1 = 2$
$-1 \quad -1$

$+1 - 1 = 0$. Cross it off.

$a = 1$

1. $a + 1 = 2$

$a + 1 = 2 - 1$

Cross it off, bring to the other side, and change the sign from positive to negative.

$a = 1$

---

2. $a - 1 = 2$

$a - 1 = 2$
$+1 \quad +1$

Add 1 to both sides

$a - 1 = 2$
$+1 \quad +1$

$-1 + 1 = 0$. Cross it off.

$a = 3$

2. $a - 1 = 2$

$a - 1 = 2 + 1$

Cross it off, bring to the other side, and change the sign from negative to positive.

$a = 3$

---

3. $2a = 4$

$\frac{2a}{2} = \frac{4}{2}$

Divide both sides by the number in front of the letter.

$\frac{2a}{2} = \frac{4}{2}$

$\frac{2}{2} = 1$. Cross it off.

$a = 2$

3. $2a = 4$

$2a = \frac{4}{2}$

Cross it off and place it BELOW the other side.

$a = 2$

---

4. $\frac{a}{2} = 3$

$2 \times \frac{a}{2} = 3 \times 2$

Multiply both sides by the number below the letter.

$2 \times \frac{a}{2} = 3 \times 2$

$\frac{2}{2} = 1$. Cross it off.

$a = 6$

4. $\frac{a}{2} = 3$

$\frac{a}{2} = 3 \times 2$

Cross it off and times by 3.

$a = 6$

---

5. $\frac{2}{a} = 1$

$a \times \frac{2}{a} = 1 \times a$

Multiply both sides by a.

$a \times \frac{2}{a} = 1 \times a$

$\frac{a}{a} = 1$. Cross it off.

$2 = a$

5. $\frac{2}{a} = 1$

$\frac{2}{a} = 1 \times a$

Cross it off and times by 1.

$2 = a$

Notice: method #1 and method #2 produce identical answers.

---

6. $x^2 = 25$

$\sqrt{x^2} = \sqrt{25}$

Square root both sides.

$x = 5$

7. $x + 4 = 2x$
$-x \quad -x$

Subtract x from both sides

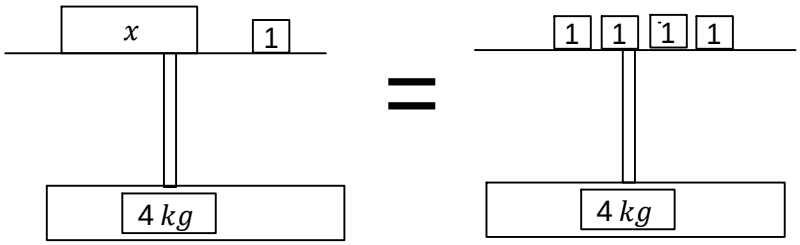
$4 = x$

M8 - 10.0 - Golden Rule Scale Picture Notes

$\boxed{1} = 1kg$

The Golden Rule: Whatever you do to the right side of the equal sign, do to the left side.

What plus 1 = 4 ?

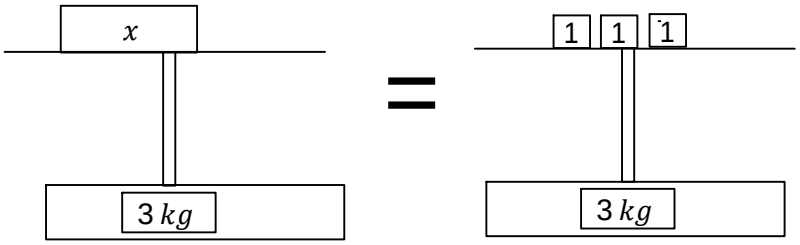


$x + 1 = 4$

$x + 1 = 4$

$-1 \quad -1$

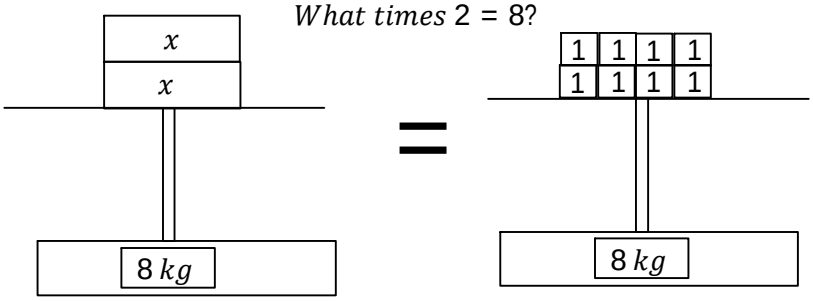
$x = 3$



Take off one from both sides

$x = 3$

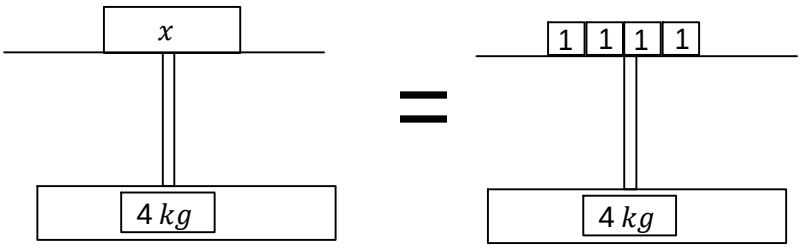
What times 2 = 8?



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

$x = 4$

$2x = 8$



Divide both sides by two

$x = 4$

M8 - 10.0 - Multiply By LCD Review

Or Add/Subtract Fractions with LCD.
Or Cross Multiplication/Algebra

$$\frac{x}{2}+\frac{1}{4}=\frac{3}{4}$$
$$\left(\frac{x}{2}+\frac{1}{4}=\frac{3}{4}\right)\times 4$$
$$\frac{4x}{2}+\frac{4}{4}=\frac{12}{4}$$
$$2x+1=3$$
$$-1 \quad -1$$
$$2x=2$$
$$\frac{2x}{2}=\frac{2}{2}$$
$$x=1$$

Multiply by the LCD=4

$$\frac{x}{2}+\frac{1}{4}=\frac{3}{4}$$
$$\frac{2}{2}\times\frac{x}{2}+\frac{1}{4}=\frac{3}{4}$$
$$\frac{2x}{4}+\frac{1}{4}=\frac{3}{4}$$
$$\left(\frac{2x}{4}+\frac{1}{4}=\frac{3}{4}\right)\times LCD$$
$$2x+1=3$$
$$-1 \quad -1$$
$$2x=2$$
$$\frac{2x}{2}=\frac{2}{2}$$
$$x=1$$

Get an LCD then Multiply by the LCD

All three are the same question! Which solution do you like the best?

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

Instead of actually multiplying by the LCD we are going to multiply and simplify at the same time.

$$\frac{x}{2}+\frac{1}{4}=\frac{1}{2}$$
$$\left(\frac{x}{2}+\frac{1}{4}=\frac{1}{2}\right)\times LCD$$
$$\frac{4x}{2}+\frac{4}{4}=\frac{4}{2}$$
$$2x+1=2$$
$$2x=1$$
$$x=\frac{1}{2}$$

$LCD = 4$

$$\left(\frac{x}{2}+\frac{1}{4}=\frac{1}{2}\right)\times LCD$$
$$2x+1=2$$
$$2x=1$$
$$x=\frac{1}{2}$$

Instead of actually multiplying by the LCD we are going to multiply and simplify at the same time.

M8 - 10.0 - Equations Theory Notes

What's the goal?

To get the letter by itself. (On top with a 1 in front)

Is it by itself?

Yes or no.

What is attached to it on its side of the equal sign?
What operation is being applied?

How do we cross it/them off?

What is the opposite operation?

Do the opposite to both sides.

Cross it off.

Repeat

Remember: Generally, working with equations, we do BEDMAS backwards, starting with S. This is only a general rule, sometimes it doesn't hold true.

$x + 2 = 5$

$x + 2 = 5$
$-2 \quad -2$ Subtract 2 from both sides.

$x + 2 = 5$
$-2 \quad -2$ Plus 2 minus 2 equals 0, cross it off.

$x = 3$

$3x - 3 = 6$

$3x - 3 = 6$ Add 3 to both sides.
$+3 \quad +3$

$3x = 9$

$\frac{3x}{3} = \frac{9}{3}$ Divide both sides by 3

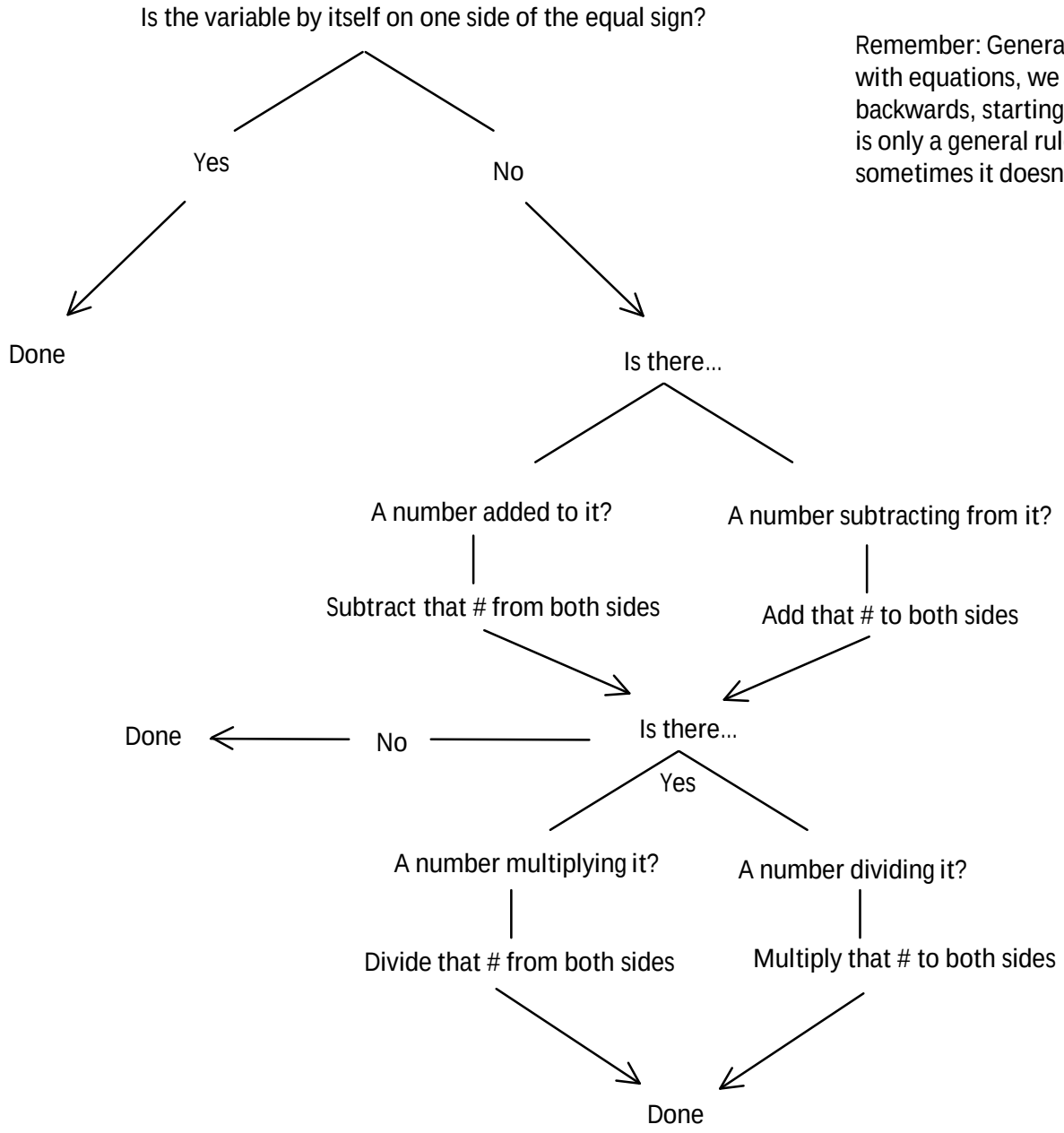
$x = 3$

M8 - 10.0 - Equations Theory Tree Notes

OPPOSITE

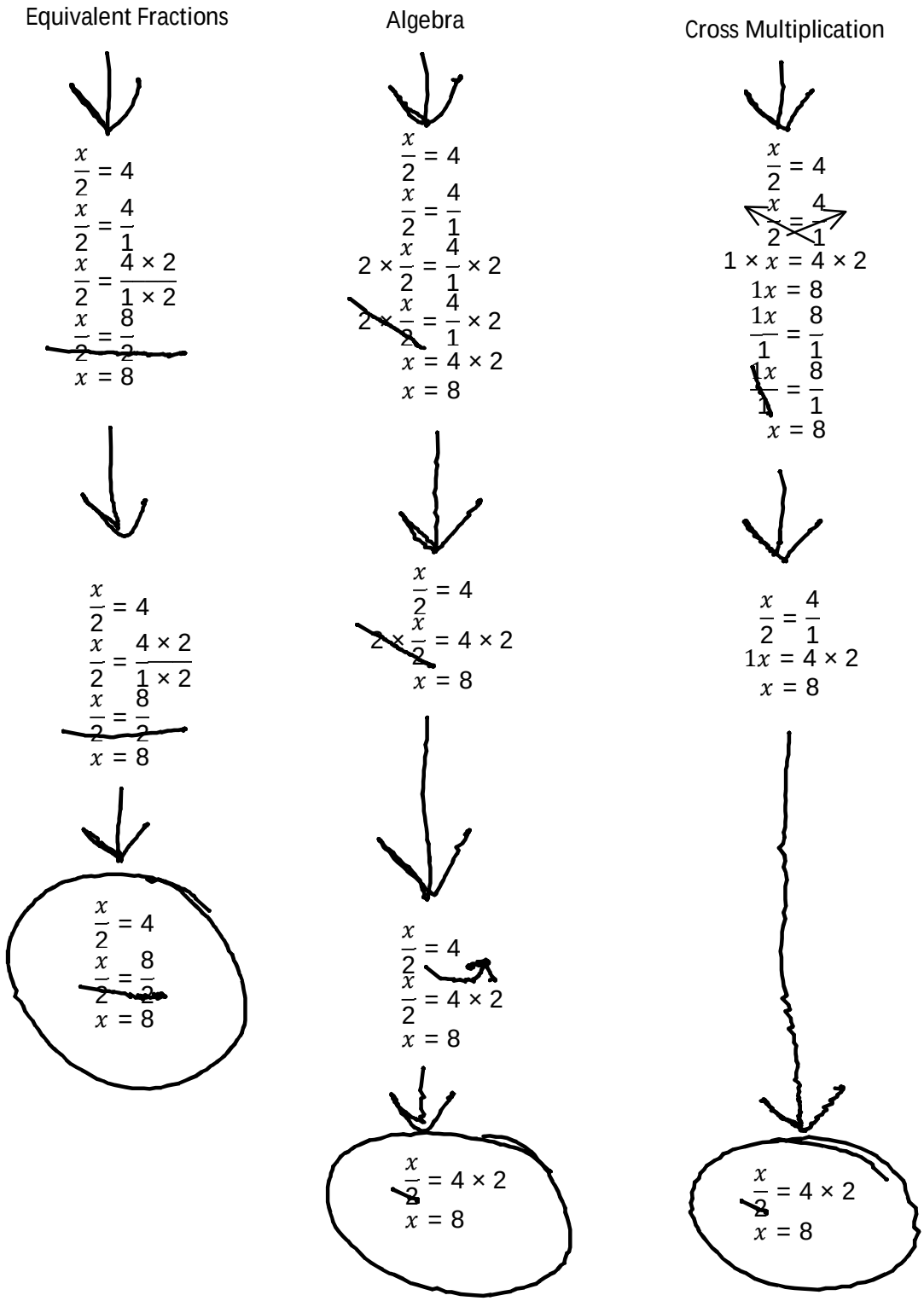
What's the goal?

To get the letter by itself. (On top with a 1 in front)



Remember: Generally, working with equations, we do BEDMAS backwards, starting with S. This is only a general rule, sometimes it doesn't hold true.

M8 - 10.0 - Equiv Fracts - Algebra - X-Mult Review



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M8 - 10.0 - Substitution/Check Answer Notes

$a = 2$, what does $3a$ equal? $3a = ?$

$3a = ?$
$3(2) = 6$

Just put 2 in for a.

$a = -2$, what does 4a equal? $4a = ?$

$4a = ?$
$4(-2) = -8$

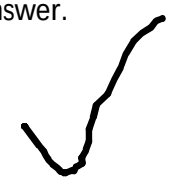
Just put -2 in for a.

Substitution is also used to check your answer.

$x + 2 = 5$
$-2 \quad -2$
$x = 3$

Now check your answer.

$x + 2 = 5$
$(3) + 2 = 5$
$5 = 5$



Left-hand-side equals right-hand-side, correct.

Substitute a point into an equation to see if the point is on the line

$y = x + 2$
$4 = 2 + 2$
$4 = 4$

(x, y)
(2,2)