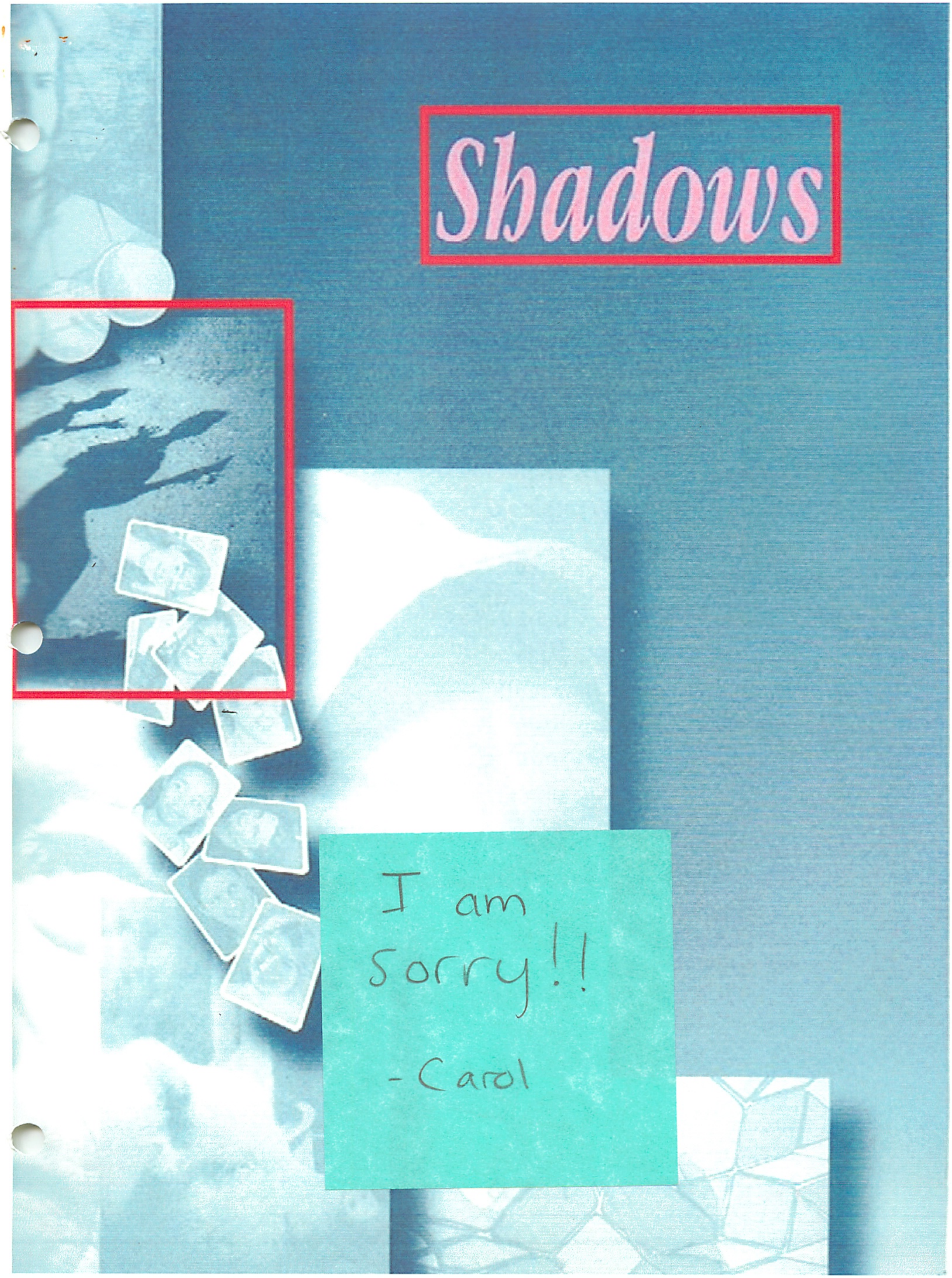
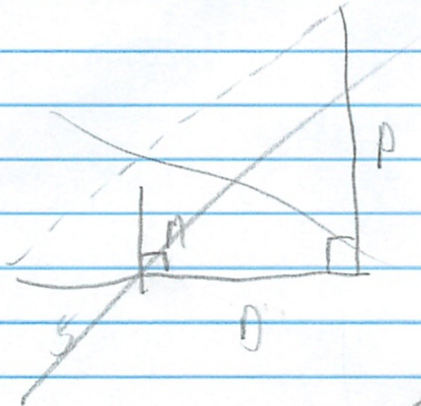
Shadows



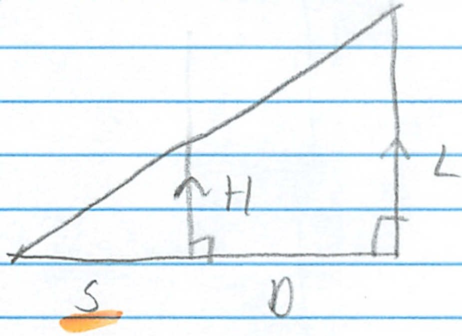
I am sorry!!

-Carol

Shadows

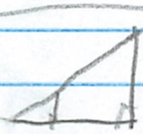


$S = f(H, D, F)$

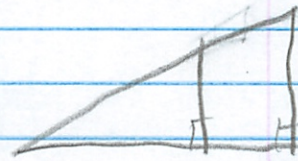


If 2 angles angles of 1 triangle are congruent to 2 angles of another triangle, the 3rd angle is = in both triangles

---



Short D, Long S



other shadows

H is just shorter then L long S

If H > L - no S - never meets

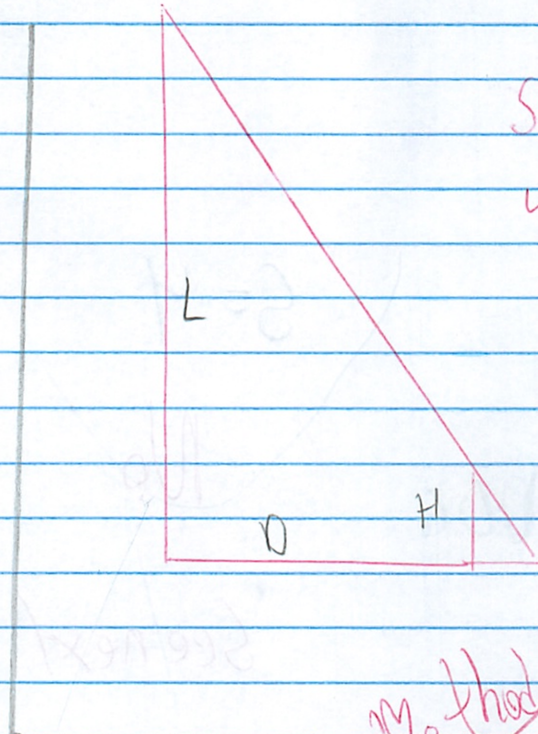
L is much greater then H, short S

Longer D, smaller S

Longer D, smaller the S
Taller H, longer S
Taller L, shorter S
If H > L - undefined
If D = 0, S = 0

Watch Letters

#2



$S=f(h,d,L)$

$4=f(6,20,46)$

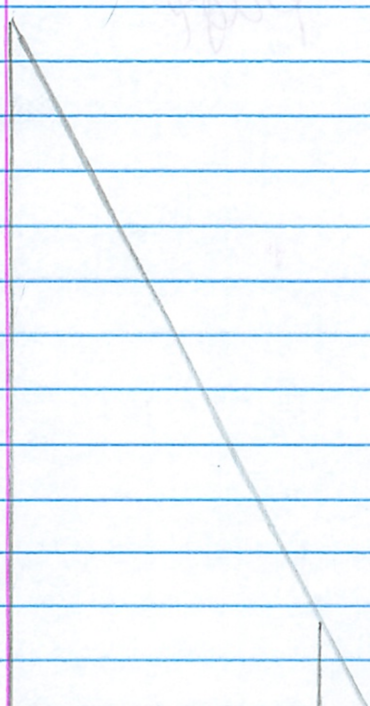
$S=\cancel{8}\ 4$

Method:

Draw + Measure

If L is increased by 10, S is increased by 1. Otherwise insufficient data.

#1



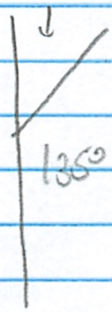
$6/2=3$

$3=f(6,20,46)$

$S=f(h,d,l)$

Angle

Exterior
45°



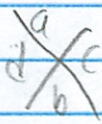
135° Interior
Angle

complementry add to 90°

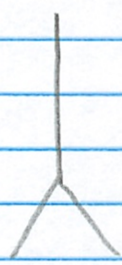
> parel symbol

vertical angle
are =

same

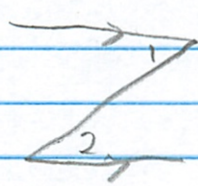


- a + c supliment
(add to 180°)

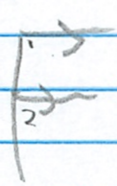


no vertical
angles

If corsponding
angles are in preportion
triangle is similar.



1+2
are congruent
alternate interior angles

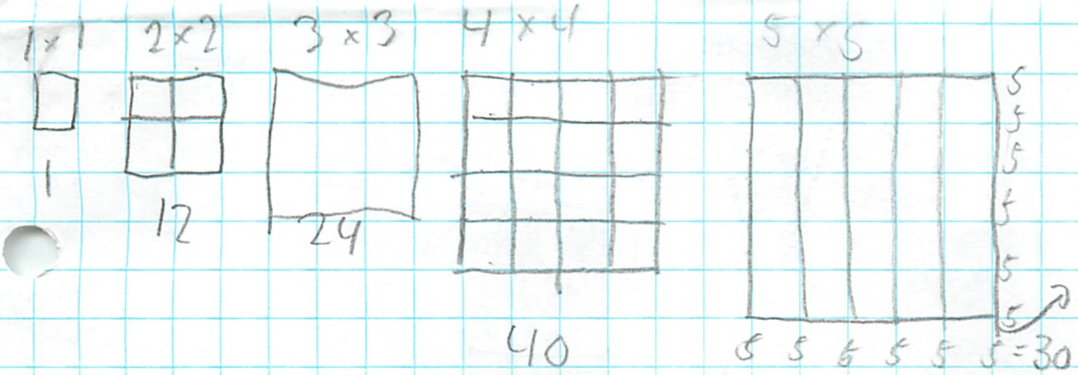


1+2
congrevent

corsponding
angles

#4 4/5

N by N window



30 + 30 = 60

60

6	84
7	112
8	144
9	180
10	220

$$2(x^2+x)$$

$$2x^2+2x$$

$$2(n \times (n+1))$$

In a n×n square, there is 1 more row then what n is. The row is the lengh of n. ~~The colum~~ There as the same numbers of coloums as rows

More Windows #15

4/5

$(n^2+n)+(m^2+m)$

$(2^2+2)+(4^2+4)$

$(4+2)+(16+4)$

$6+20$

26

m

n

$n \times (m+1) + m \times (n+1)$

$2 \times (4+1) + 4 \times (2+1)$

$2 \times 5 + 4 \times 3$

$10 + 12$

22

$(n^2+n)+(m^2+\cancel{m})$

n^2+n+m^2

$4+2+16$

$8+16$

22

3^2+3+2^2

$9+3+4$

16

m

n

$3 \times (2+1) + 2 \times (3+1)$

$3 \times 3 + 2 \times 4$

$9 + 8$

17

~~n^2+n+m^2~~

m

n

5^2+5+1^2

$25+5+1$

31

No

$5(1+1)+1(5+1)$

$5(2)+1(6)$

$10+6$

16

- My 1st
- 2nd Alex
- 3rd My

Answer $(m+1)n+(n+1)m$

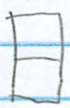
#4 + 5
Explanation

4/8

On a ~~[illegible]~~ window panes there are both horzontal

and vertical lines. On this size 1x1 square their are 2 horzontal lines + 2 vertical lines.

On a 2x2 square there are 3 horzontal + 3 vertical lines. You notice that the number of horzontal + vertical lines are the same on a square



With a 2x1 square, there are 3 horzontal line and 2 vertical.

You may notice that the # of horzontal lines is whatever the number of rows of the square is plus one.

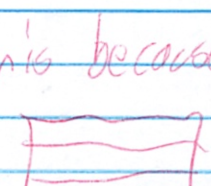
This is the same for vertical lines and the number of coloms

Their fore : $n(m+1) + (n+1)m$

or a square $2(n \times (n+1))$ or $2x^2 + 2x$

Whats with $n \times n+1$ the n is because window in not 1x1

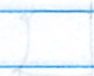
I forget



#4, 5

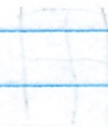
Explanation

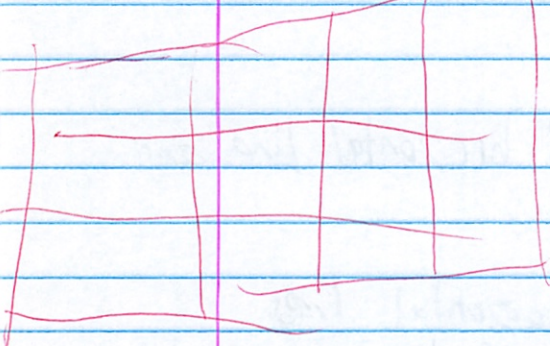
4/6

In a ~~[illegible]~~ window pane there are both horizontal 

and vertical lines. On the size 1x1

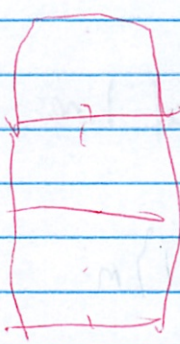
square there are 3 horizontal lines + 2 vertical lines.

On a 2x2 square there are 3 horizontal + 3 vertical lines.
notice that the number of horizontal + vertical
lines are the same on a square. 



With a 2x1 square, there are 3 horizontal lines and
2 vertical. 

You may notice that the # of horizontal lines
is whatever the number of rows of the square is
plus one.

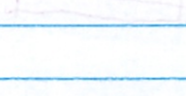


This is the same for vertical lines and the
number of columns.

Rectangle: $n(m+1) + (n+1)m$

or a square: $2(n \cdot (n+1))$ or $2x^2 + 2x$

Thats with ~~[illegible]~~ n at the top because window is not that
large.



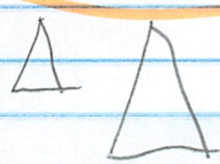
Same Shape #6

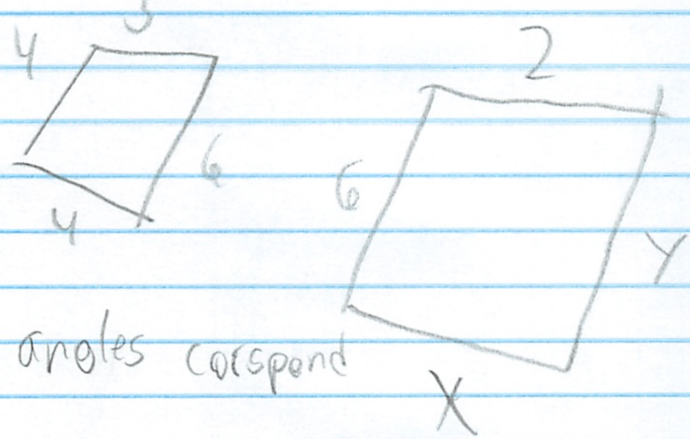
4/7

1. Not same, simiar

2. all angles must be same measure,
side must change

* polygon - same angles and
corsponding sides must be in preportion





angles corspond

x = 6

y = 9

z = 4.5

$\frac{2}{3} = \frac{4}{6} = \frac{4}{x} = \frac{6}{y} = \frac{3}{2}$

must hold same ratio or prepration

ratio

Take

$\frac{3}{2} = \frac{4}{4} = \frac{12}{8}$ still =

3. a. not same shape
b. different
c. similar - bases are same
d. different - flipped + dimiar (use ratio)

Must do

Check Rule

State of Liberty #7

4/7

1. Davids nores = 2" ~~4~~ Statue = 4'6"
Dave's arms = 33" Statue arms = ?

Don't relate ~~$\frac{2}{33}$~~

$\frac{2}{54} = \frac{33}{?}$ $\frac{\text{David}}{\text{statue}}$ not $\frac{\text{Nose}}{\text{Arm}}$

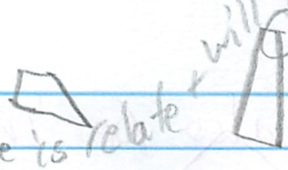
$\frac{\cancel{2}^{1}}{\cancel{54}_{27}}$ 33 = 891 / 12

74' 3" ← Statue Arm

$\frac{\text{parts of 1}}{\text{parts of 2}}$

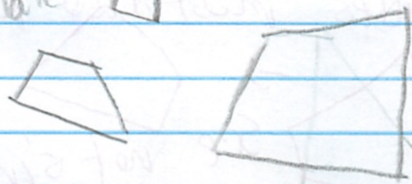
Counter Examples

will change - if change other angles



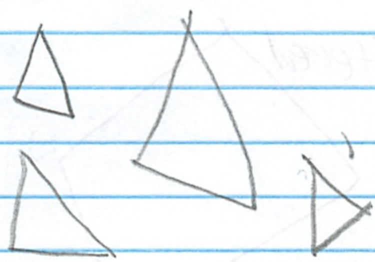
pg 22 #1 True, 1 side is relate

#2 False all See →



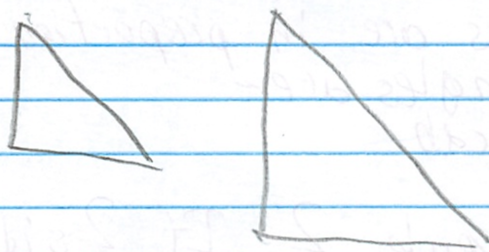
#3 True, also has 3 angles the same

#9 #1 True



#2 False

#3 True



but what about the And Mr. T underlined 3 times in statement

Check vocab in next pgs.

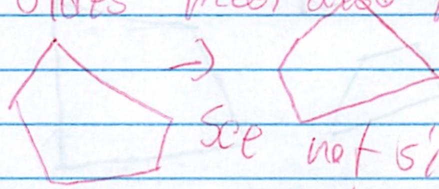
But can only be similar if

- angles are = and
- all sides in proportion

Back for re-do

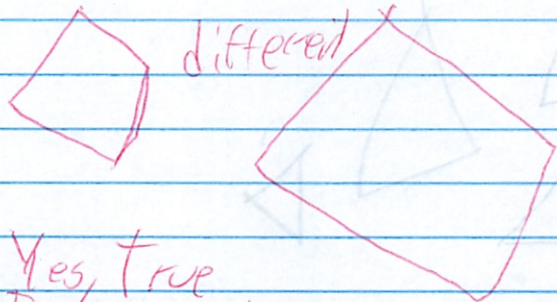
Redo

p422- #1 - F sides must also be inproportion



See not similar

#2 F - same as above must have both



differend

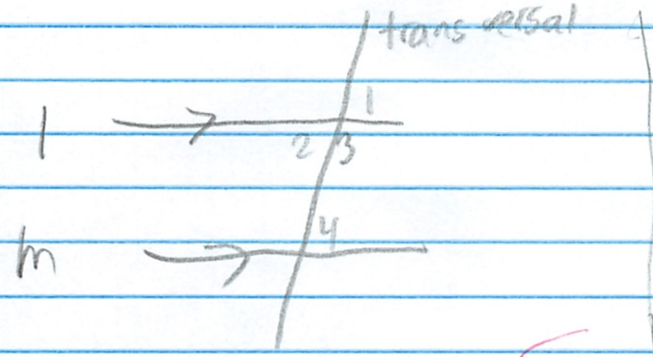
#3 Yes, True
If 2 sides are in preportion then its Similar, so 2 angles are =

#4 #1 True - See vocab

#2 True - See vocab 2 - If 2 sides are =, triangle are =

#3 True - See vocab

Geo Vocab



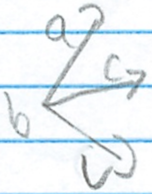
$\cong$ = Congruent
$\angle$ = angle
$m\angle 1$ = mesure of angle 1

vertical angles ($\angle 1 \cong \angle 2$) are congruent

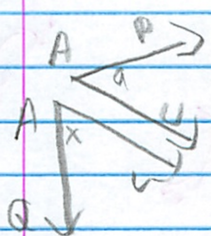
2 angles sum to 90° = complementary
" " " " 180° = supplementary

$\angle 1 + \angle 3$ are adjecent
$\angle 2 + \angle 3$ are adjecent

$m\angle 1$ and $m\angle 4$ are equal
Parell lines cut by transversal
Corsponding angles are $\cong$
$m\angle 2$ and $m\angle 4$ are equal
parell lines cut by a transversal
alternate interior angle are $\cong$

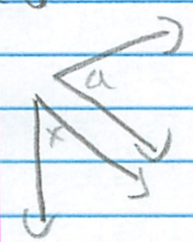


angle $\angle abc$
$\angle abc$
are adjecent



not adjecent because share comon ray

removed lables

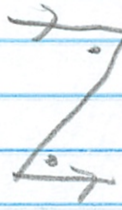


not adjecent

because you don't know that they share $\overrightarrow{AU}$

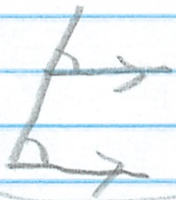
Geo Vocab
Cont

4/8



• = alternate interior angle

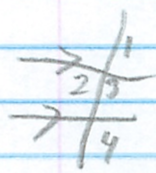
$m\angle 1$ = measure of angle 1



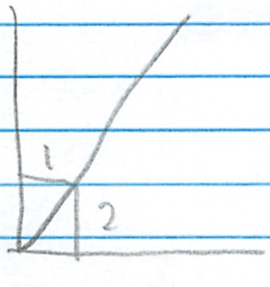
= corresponding angles

Mini Proof

Statement	Reason
$\angle 1 \cong \angle 4$ or $m\angle 1 = m\angle 4$	Given: parallel lines cut by a transversal corsponding ∠'s are ≅
$\angle 1 \cong \angle 2$	vertical angles are ≅
$\angle 2 \cong \angle 4$	transitive property If a = b and a = c then b = c



Prove $m\angle 2 = m\angle 4$



Complmentry

$m\angle 1 + m\angle 2 = 90^\circ$

Geometry Vocab

4/11

- 2 polygons (with the same # of sides) are similar if
  - their corresponding angles are equal <u>and</u>
  - their corresponding angles are proportional in length
- The <u>line</u> through 2 points A and B will be written as $\overleftrightarrow{AB}$
- The <u>line segment</u> connecting A and B will be written as $\overline{AB}$ and the length of this segment will be written as AB.
- The ray from A through B will be written as $\overrightarrow{AB}$
- If the sides of a triangle have the same lenghts as the corsponding sides of another triangle, then the triangles must be congruent.
- If the sides of 1 polygon have the same lenghts as the corsponding sides of another polygon, then the polygons <u>do not</u> have to be congruent.

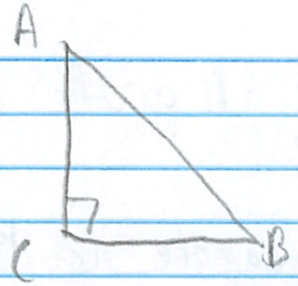
  like a square w/ all sides = 4 in not like a rhombus w/ all sides 4 length

- If 2 triangles have their corrsponding sides proportional, then the triangles must be similar.
- If 2 triangles have their corrsponding angles equal, then the triangles must be similar.

Cont →

Geo cont

4/11



A right triangle is a triangle w/ a right angle

The 2 sides that form the right angle $\overline{AC}$ and $\overline{BC}$ are called the leg.

The side opposite the right angle, $\overline{AB}$ is called the hypotenuse.

Each of the acute angles of a right triangle is formed by the hyponeuse and one of the legs. Angle A is formed by the hypotenuse $\overline{AB}$ and by the leg, $\overline{AC}$

The leg that helps form an acute angle is said to be adjacent to that angle, $\overline{AC}$ is the leg that is adjacent to angle A

$\overline{AC}$ is said to be opposite to angle B.

If the legs of 2 right triangles are proportional, then the triangles must be similar.

2 lines that meet at right angles are called perpendicular

A triangle with an obtuse angle is called an obtuse triangle

Over

A triangle whoes angles are all acute angles is called an acute triangle

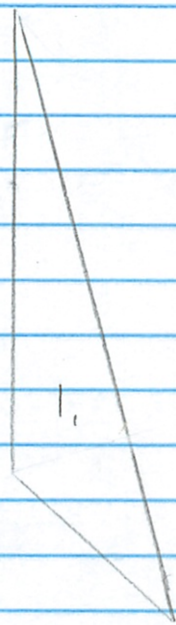
The sum of the angles of a triangle is 180°

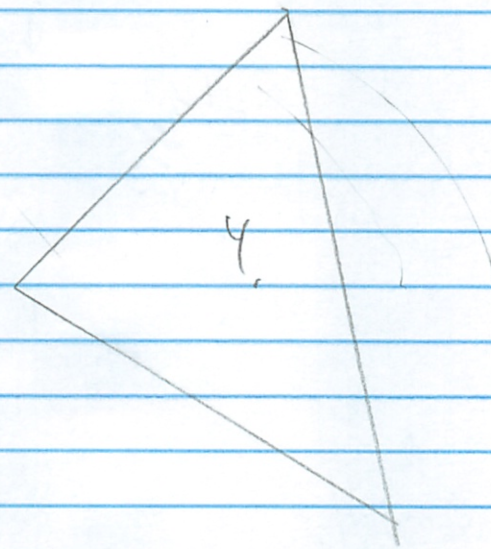
* The sum of lenghts of any 2 sides of a triangle must be more then the lenght of a third (this is called triangle Inequality)

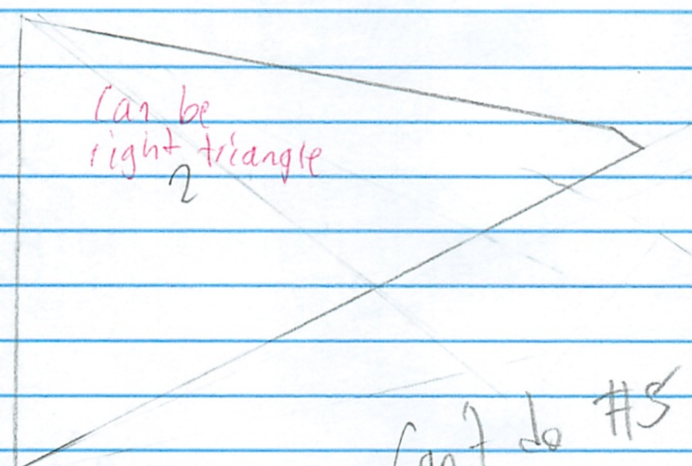
* If 2 angles of 1 triangle are = to 2 angles of another triangle, then the triangles must be similar.

Warm up 4/12

Draw Triangles

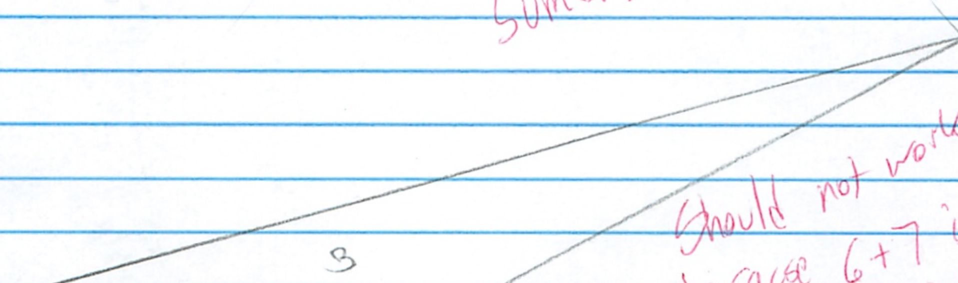






Can't do #5

triangle inequality
sum of 2 sides > third side



Should not work
because 6+7 is not > 13
or 6+7 $\not>$ 13

1. 72°, 78°, ?, → 30

180
-72
108
-78
30

Very Special Triangles (#12)

4/13

1. The 2 other angles must both be acute because 1 angles is 90°, and 3 angles must sum to 180°. That leaves 2 angles w/ 90° to split between them, An angles can't be 0° in a triangle so it must be 89° and 1° and they would still be acute.

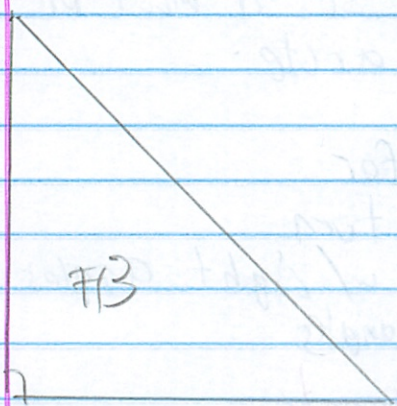
2. ? only 2 angles to account for
   90° ×4 makes a complete turn
   we build and make squares w/ right angles
   a square is 2 right triangles
   measure hypernose   trignomatry

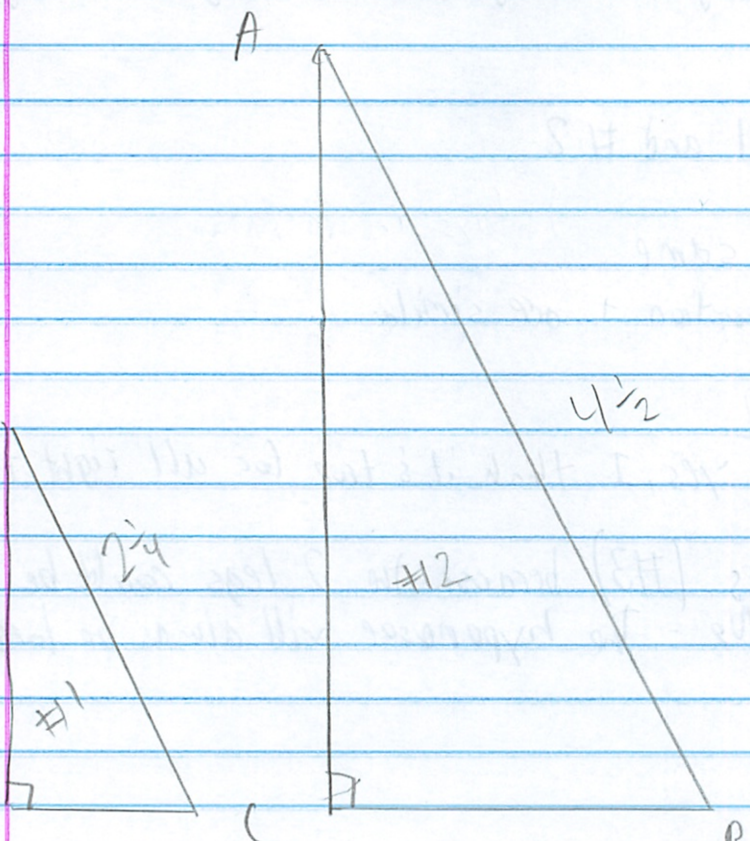
3. Hypernouse is longer then legs
   Hypernose lenght is figured using lenghts of legs

4. See back #1 and #2
   a. it is double
   b. they are the same
   c. they are in proportion + are similar

5. See back #2
   opposite - yes, I think it's true for all right triangles

6. Isoseles - Yes (#13) because the 2 legs could be =
   Equilateral - No - The hyponosoe will alwas be longer


#3


A
4 1/2
2 1/4
#12
#1
C
B

What's Possible

p432

4/12

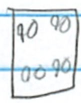
Part 1: ~~All~~ Angles must add to 180°

Tr: Part 2: Sides must be more then third.

Triangle Inequalty

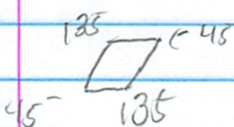
Part 3

Angles



= 360

Quad

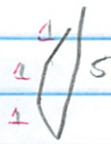


= 360

(*) A Quadralateral will sum to 360°

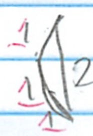
Sides

? All sides must be more then fourth



Yes

$S_1 + S_2 + S_3 > S_4$



$\sum_{S1}^{S4-1} > S4$

(*) Yes 3 sides must be shorter then 4th

Part 4

Angles

Sides	Total
3	180
4	360
5	540
⋮	
n	(n-2)·180 -or-

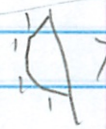
Poly (*)

180(n-2) or

Source: Prior knolage

180n-360

Sides



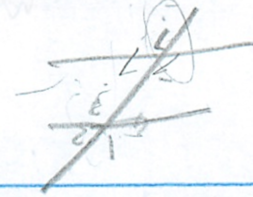
Quad Rule

Penta Rule → 4 sides must be Shorter then 5th

(*) Poly Rule → (n-1) sides must be shorter then nth

So if you add all the sides except 1, the last side measure should be less then the sum of all thes other sides

$S1 + S_2 + S_3 + S_4 \cdots > S_{n-1}$



Inventing Rules #13

$\frac{6}{15} = \frac{14}{x} = \frac{9}{p}$

$\frac{MO}{JA} = \frac{OE}{AY} = \frac{EM}{YJ}$

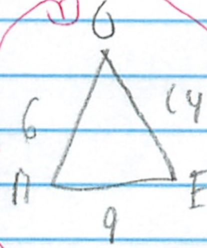
$\frac{6}{15} \times \frac{14}{x}$ cross up products

$\frac{220}{6} = \frac{6x}{6}$ Equation solve

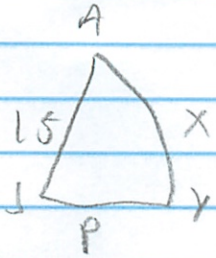
$35 = x$

2

1



3



$\triangle MOE \sim \triangle JAY$

Keep in order of name

$\frac{6}{15} = \frac{9}{p}$

$\frac{2}{5} \times \frac{9}{p}$

$\frac{45}{2} = \frac{2p}{2}$

$22\frac{1}{2} = p$

#1 $\frac{x}{5} = 7$

Do $7 \times 5 = 35$

$\frac{35}{5} = 7$

#2 $\frac{x}{6} \times \frac{72}{24}$

$\frac{x}{6}$ $\frac{3}{1}$

$\frac{18}{6} = \frac{72}{24}$

#3 $\frac{x}{8} \times \frac{11}{4}$

$\frac{88}{4} = \frac{4x}{4}$

$22 = x$

$\frac{22}{8} = \frac{11}{4}$

#4 $\frac{x}{7} \times \frac{5}{3}$

$\frac{35}{3} = \frac{3x}{3}$

$11\frac{2}{3} = x$

$\frac{11\frac{2}{3}}{7} = \frac{5}{3}$

#5

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

similar

$\frac{1+1}{3} = \frac{4}{6}$

or

$6(x+1) = 3 \times 4$

$6x + 6 = 12$

$-6 \quad -6$

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

$x = 1$

#6 $\frac{5}{13} \times \frac{19}{x}$

$\frac{247}{5} = \frac{5x}{5}$

$49.4 = x$

$\frac{5}{13} = \frac{19}{49.4}$

#7 $\frac{2}{x} = 6$

$6 \times 2 = 12$

$\frac{2}{12} = 6$

#8 $\frac{9}{x} \times \frac{x}{16}$

~~Can have multiple ans~~

~~$\frac{9}{18} = \frac{8}{16}$~~

x must be same

Still cross

$x \times x = 9 \times 16$

$x^2 = 144$

$\sqrt{x} = \sqrt{12}$ or $x = -12$

$\frac{9}{12} = \frac{12}{16}$

~~12~~

~~7~~

Michael Plasmeier

All Correct 100%

1. A pole that is 10 feet high casts a 6 foot shadow.

   a. How long a shadow will a 40 foot high pole cast?

   24 ft

   $\frac{\text{pole}}{\text{shadow}}$: $\frac{10}{6}$ $\frac{40}{x}$ $x = 24$

   b. If a pole has a 15 foot shadow, how high is the pole?

   25 ft ~~9 ft~~

   other way

2. A 10 foot tall tree casts a 6 foot shadow.

   a. Another tree casts a 15 foot shadow. How tall is it?

   25 ft

   $\frac{10}{6}$ $\frac{x}{15}$ $x = 25$

   c. How long a shadow will a 32 foot tall tree cast?

   19.2 ft

   $\frac{10}{6}$ $\frac{32}{x}$ $x = 19.2$

3. A map is scaled so that 1 inch on the map is equal to 2 miles.

   a. How many inches on the map is a 12 mile distance?

   6 inches

   $\frac{\text{in}}{\text{mi}}$: $\frac{1}{2}$ $\frac{x}{12}$ $x = 6$

   b. What distance is represented by 17 inches on the map?

   34 miles

   $\frac{1}{2}$ $\frac{17}{x}$ $x = 34$

4. A map is scaled so that 2 inches on the map is equal to 3 miles.

   a. How many inches on the map is a 12 mile distance?

   8 inches

   b. What distance is represented by 30 inches on the map?

   45 miles

   c. What distance is represented by 17 inches on the map?

   25.5 miles

5. A map is scaled so that 5 inches on the map is equal to 8 miles.

   a. How many inches on the map is a 12 mile distance?

   7.5 inches

   b. How many inches on the map is a 30 mile distance?

   18.75 inches

   c. What distance is represented by 8 inches on the map?

   12.8 miles

   d. What distance is represented by 17 inches on the map?

   27.2 miles

6. A 13 foot tall tree casts a 5 foot shadow.

   a. Another tree casts a 12 foot shadow. How tall is it?

   31.2 feet

   b. How long a shadow will a 32 foot tall tree cast?

   $12\frac{4}{13}$ ft

$\frac{\text{tree}}{\text{shadow}}$ $\frac{13}{5} = \frac{x}{12}$ $\frac{5x}{5} = \frac{156}{5}$ $31.2 = x$

$\frac{13}{5}$ $\frac{32}{x}$ $\frac{13x}{13} = \frac{160}{13}$ $x = 12\frac{4}{13}$

$\frac{x}{x-1} = \frac{3}{4}$ 4x = 3(x − 1) 4x = 3x − 3 −3x −3x x = −3

$\frac{2x}{x+1} = \frac{3}{2}$ 3(x + 1) = 2x(2) 3x + 3 = 4x −3x −3x 3 = x Note

Find the value of x.

1. $\frac{9}{x} = \frac{3}{4}$

3x = 36, x = 12

2. $\frac{x}{2} = \frac{3}{5}$

5x = 6, x = 1.2 $1\frac{1}{5}$ use fractions!

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

2x = 18, x = 9

4. $\frac{3}{2} = \frac{x+1}{8}$

2(x + 1) = 24, 2x + 2 = 24, 2x = 22, x = 11

5. $\frac{x}{-2} = \frac{3}{4}$

4x = −6, x = −1.5 $-1\frac{1}{2}$

6. $\frac{6}{-5} = \frac{x}{6}$

−5x = 36, −x = −7.2, x = 7.2 (−) is negative

7. $\frac{x+3}{6} = \frac{2}{3}$

3(x + 3) = 12, 3x + 9 = 12, 3x = 3, x = 1

8. $\frac{4}{5} = \frac{7}{2x+1}$

4(2x + 1), 8x + 4 = 35, 8x = 31, $x = 3\frac{7}{8}$

9. $\frac{8}{3} = \frac{5x}{6}$

3(5x) = 48, 15x, ~~15 + 3x~~ = 48, 3x = 33, x = 11, 15x, $3\frac{1}{5}$

10. $\frac{5}{3} = \frac{x-1}{-2}$

3(x − 1) = −10, 3x − 3 = −10, +3 +3, 3x = −7, $x = -2\frac{1}{3}$

11. $\frac{3x+1}{6} = \frac{2}{3}$

3(3x + 1) = 12, 9x + 3 = 12, −3 −3, 9x = 9, x = 1

12. $\frac{3x}{2} = \frac{5}{6}$

6(3x) = 10, 18x = 10, $x = \frac{5}{9}$

13. $\frac{18}{4x-3} = \frac{1}{2}$

4x − 3 = 36, +3 +3, 4x = 39, x = 9.75 $9\frac{3}{4}$

14. $\frac{x}{2} = \frac{4}{3}$

3x = 8, $x = 2\frac{2}{3}$

15. $\frac{3}{5} = \frac{2}{4x+1}$

distributive property? 3(4x + 1) = 10, 12x + 3 = 10, −3 −3, 12x = 7, x = ~~$1\frac{5}{7}$~~ $\frac{7}{12}$ see it's there

16. $\frac{-3}{4} = \frac{x}{-8}$

4x = 24, x = 6

Shadows 3

Michael Plasmeier

Properties of Proportions - Worksheet

Find the value of the given variable:

1. $\frac{x}{8} = \frac{12}{18}$

$18x = 96$

$\frac{18x}{18} = \frac{96}{18} = 5\frac{1}{3}$

$x = 5\frac{1}{3}$

2. $\frac{x}{12} = \frac{60}{45}$

$\frac{45x}{45} = \frac{720}{45}$

$x = 16$

3. $\frac{c}{6} = \frac{12}{15}$

$\frac{15c}{15} = \frac{72}{15}$

$c = 4.8$

4. $\frac{q}{56} = \frac{15}{14}$

$\frac{14q}{14} = \frac{840}{14}$

$q = 60$

5. $\frac{8}{d} = \frac{40}{30}$

$\frac{40d}{40} = \frac{240}{40}$

$d = 6$

6. $\frac{1}{2} = \frac{z}{25}$

$\frac{2z}{2} = \frac{25}{2}$

$z = 12.5$

$12\frac{1}{2}$

7. $\frac{3x}{21} = \frac{5}{3}$

$3x(3) = 105$ ← would be $9x$

$\frac{9x}{9}$ $\cancel{9+3x} = 105$ ~~add to the property~~

$\cancel{3x} = \cancel{96}$ 9

$x = \cancel{32}$ $11\frac{2}{3}$

8. $\frac{x}{9} = \frac{16}{x}$

$x(x) = \cancel{96}$ 144

$x^2 = \cancel{96}$

$\sqrt{}$ $\sqrt{}$

$x = \cancel{9.79}$ 12 or -12

! can also be !

9. $\frac{9}{12} = \frac{x-1}{4}$

$12(x-1) = 36$

$12x - 12 = 36$

$+12 \quad +12$

$12x = 48$

$x = 4$

Correct distributive

10. $\frac{x}{6} = \frac{1}{2}$

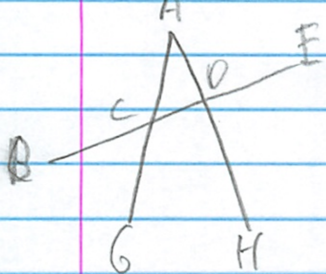
$\frac{6}{2} = \frac{2x}{2}$

$3 = x$

$12(x-1) = 12x - 12$ do but not

$3x(3) = 9x$

What's the angle? #14

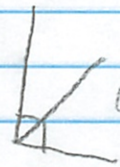


1. What's =
   whats sum relations
2. Other diagrams for that
3. Generlize

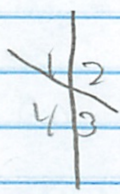
1. Angles BCG and BCA are suplimentary (add to 180°)
Angles BCG, BCA, ACD, and GCD add to ~~180~~ 360°
Angles ACD and GCD are also suplimentry (add to 180°)

Angle GCB and ACB are adjecent
Angles ACD make a triangle
Angles ACB and GCD are vertical and =m

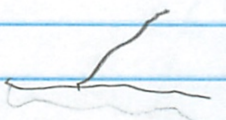
2.



complementry



∠1+3 are vertical angle (=)

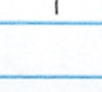


supplamentry

∠1+4 are adjecent

3. Vertical angles are = (ones oppset
Other: An line that is divided by angles adds to 180° (suplements)
A right angle (90°) cut by a line, still adds to 90° (complementry)

If you know 1 angle the suplement can be meaured as (180 - m)
If you know 1 angle here, you can easily figure the rest of the measure



Notes 4/11

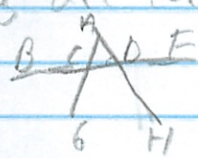
about #14

2 angles are called supplementary angles if the sum of the measures of the angles is 180°

2 angles are called complementary angles if the sum of the measure of the angles is 90°

A straight angle is an angle w/ the measure of 180°

Vertical angles are formed w/ the intersection of 2 angles

(#14 shape) 

∠ACD + ∠BCG are vertical angles

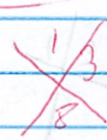
Vertical angles are alwas =

Angles that are supplements of the same angle must be =

Formal proof

G(iven): ∠1 and ∠8 are supplementary
∠1 and ∠3 " "

P(rove): ∠3 ≅ ∠8

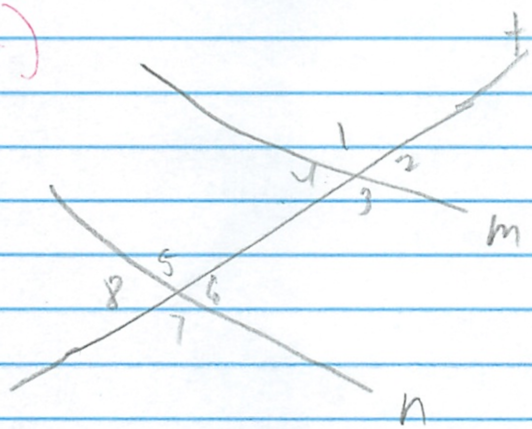
problem 

Statement	Reason
∠1 and ∠3 are supplem	Given
∠1 and ∠8 supplementry	Given
m∠1 and m∠8 = 180°	definition of supplmentre

Statement cont	Reason cont
m∠1 + m∠3 = 180°	Definition of supplm
m∠8 = 180 − m∠1	Subtracted m∠1 from both sides
m∠3 = 180 − m∠1	Subtracted m∠1 from both sides
m∠3 = m∠8	transitive property (if a = b, and b = c then a = c)

Notes $_{p^2}$ 4/11

Transversal
Corresponding angles
alterneat interior angles



When a transversal cuts accross parell lies, the Corresponding angles are ≅ (2 and 6)

When a transversal cuts accross parell lies, the alternate interior angles are ≅. (4 and 6)

alternate exterer angles (1 and 7)

2 and 7 are same side exterior

proof

See above

is parrel

G: $m \parallel n$
P: $\angle 2 \cong \angle 8$

Statement	Reson
$m \parallel n$	Given
$\angle 2 \cong \angle 4$	vertical angles are ≅
$\angle 4 \cong \angle 8$	Corrisponding angles are ≅
$\angle 2 \cong \angle 8$	transitive property

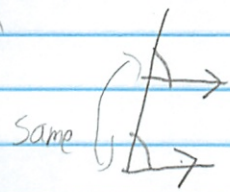
p440

4/10

Angles BCA + HCD are vertical ($\cong$)
Angles HFG + HCD correspond ($\cong$)
Angles ACD and EFG are complmentary (add to 180)

When angles are oppset, they are vertical and $\cong$

Corresponding, angles on lines cut by tranversal are =



2 angles next to each other (adjecnt) add to 180°
are are called complmentary

Angle BCF and CFG are Oppset Interior angles
and are also $\cong$

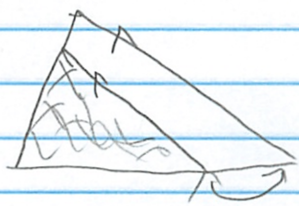
Inside Similarity #15

4/19

If you notice that the dotted line of the small triangle is parell to the 3rd side of the triangle (that dosn't touch smaller triangle.)

The simple solution to fix this is to make the dotted line parrell to the 3rd line of the triangle.

This happens becouse the lines must be parell for the ~~triang~~ angles to be = and their fore for the triangle to be similar



lines must be parell

More Proofs

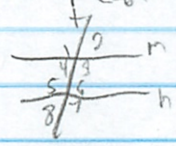
We can use 2 facts (corsponding angles are ≅ and alternate interior ∠'s are ≅) to use reasons to prove other things when we have parell lines

Trans
if a = b and b = c, then a = c

Supstution

m∠11 + m∠12 = 180; m∠11 + ∠81 = 180
m∠12 = m∠81

Proof 1



Given: m ∥ n
Prove: ∠3 and ∠6 are supplmentry

Statement	Reson
m and n are parell	Givin
∠3 and ∠7 are ≅	corsponding ∠'s are ≅
∠2 and ∠6 are ≅	corsponding ∠'s are ≅
∠2 and ∠3 supplments ~~complments~~	measures add to 180°
∠6 and ∠7 supplmentary ~~complments~~	mesures add to 180°
If 180 − ∠2 = ∠3 and ∠3 and ∠7 are ≅ then ∠7 = 180 − ∠2	~~Transitive property~~

2 adjenct w/ exterior sides (rays) forming a line

Called this?

simple way

Given: m ∥ n
Prove: ∠1 ≅ ∠7

S	R
m ∥ n	Givin
∠1 ≅ ∠3	vertical angles are ≅
∠3 ≅ ∠7	Corrsponding ∠ are ≅
∠1 ≅ ∠7	transitive property

∠2 + ∠3 = 180	Defn of Supp
∠3 = 180 − ∠2	Subtr property

Answers

m ∥ n	Givin
∠3 and ∠4 supplments	2 adjecent angles w/ exterior sides (rays) form a line
∠4 ≅ ∠6	Alternate interior angles are ≅
∠3 and ∠6 are supplments	Substution

Proportions #16

4/21

#1 $\frac{24}{20} = \frac{18}{15}$

$\frac{12}{24} = \frac{9}{18}$ ✓

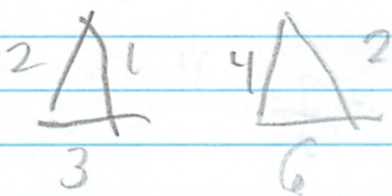
This is true that comparing 2 angles or 1 triangle to the same 2 sides of another

$\frac{12}{20} = \frac{9}{15}$

Given $\frac{20}{12} = \frac{18}{9}$

$\frac{20}{24} = \frac{15}{18}$

#2



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

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

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

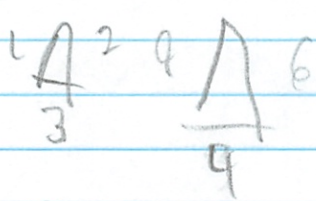
$\frac{1}{3} = \frac{2}{6}$

Yes again, it is true.

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

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

3.



That statment is no longer true

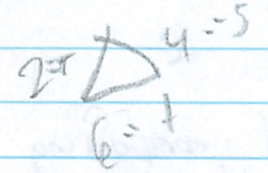
Actully statment is true, it only works for similar triangles

$\frac{1}{3} \neq \frac{9}{9}$ Don't work

$\frac{2}{3} \neq \frac{6}{9}$

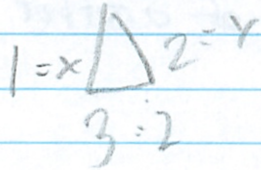
Over →

4a



Old way

$\frac{2}{1} = \frac{6}{3} = \frac{4}{2}$



b. $\frac{2}{6} = \frac{1}{3}$ $\frac{4}{6} = \frac{2}{3}$ $\frac{6}{2} = \frac{3}{1}$

$\frac{2}{4} = \frac{1}{2}$ $\frac{4}{2} = \frac{2}{1}$ $\frac{6}{4} = \frac{3}{2}$

IMP 1 SHADOWS

QUIZ #1

NAME : Michael Plasneyer 8848 DATE : 4/20

SOLVE EACH OF THE FOLLOWING - SHOW ALL WORK ~~SHOW YOUR CHECK!!~~

CIRCLE YOUR FINAL ANSWER

$19\frac{1}{2}/20$

1. $\frac{X}{10} = \frac{3}{5}$

$\frac{30}{5} = \frac{5x}{5}$

$6 = x$

2. $\frac{2}{X} = \frac{4}{11}$

$\frac{4x}{4} = \frac{22}{4}$

$x = 5.5$

3. $\frac{3}{8} = \frac{X}{100}$

$\frac{8x}{8} = \frac{300}{8}$

$x = 37.5$

4. $\frac{4X}{24} = \frac{5}{3}$

$3(4x) = 120$

$\frac{12x}{12} = \frac{120}{12}$

$x = 10$

5. $\frac{12}{X+1} = \frac{6}{8}$

$6(x+1) = 96$

$6x + 6 = 96$

$-6 \quad -6$

$\frac{6x}{6} = \frac{90}{6}$

$x = 15$

6. $\frac{6}{X+1} = \frac{3}{4}$

$24 = 3(x+1)$

$24 = 3x + 3$

$-3 \quad -3$

$\frac{21}{3} = \frac{3x}{3}$

$x = 7$

7. $\frac{X}{6} = \frac{30}{24}$

$\frac{180}{24} = \frac{24x}{24}$

$7\frac{1}{2} = x$

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

2 x's - can be ±

8. $\frac{1}{2} = \frac{X}{32}$

$\frac{32}{2} = \frac{2x}{2}$

$16 = x$

9. $\frac{X}{8} = \frac{2}{X}$

$x(x) = 16$

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

$x = \pm 4$

Duh!

10. $\frac{5}{X} = \frac{4}{3}$

$\frac{4x}{4} = \frac{15}{4}$

$x = 3.75$

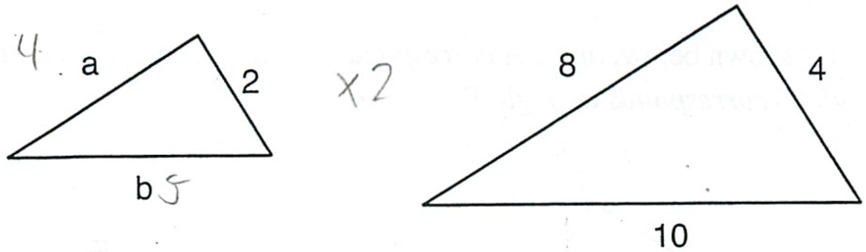
66% $\frac{4}{12}$ wrong

In each of the pairs of figures shown below, assume that the figures are similar. Then

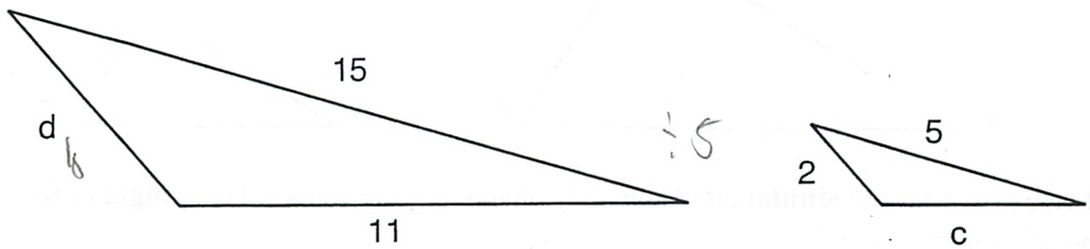
a. Write the proportion relating the sides of the figures.

b. Solve the proportions to find the missing lengths. say $\frac{4}{8} = \frac{5}{10}$ or $\frac{4}{5} = \frac{5}{10}$

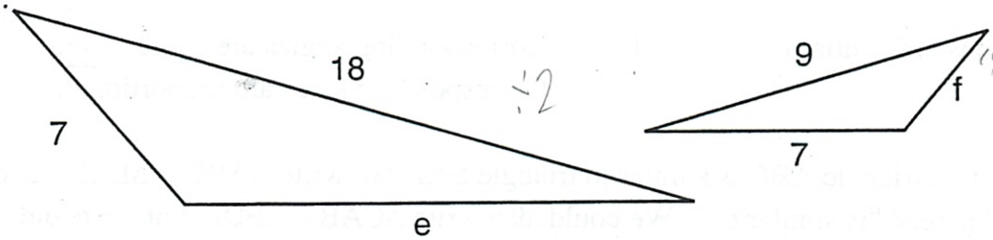
1.



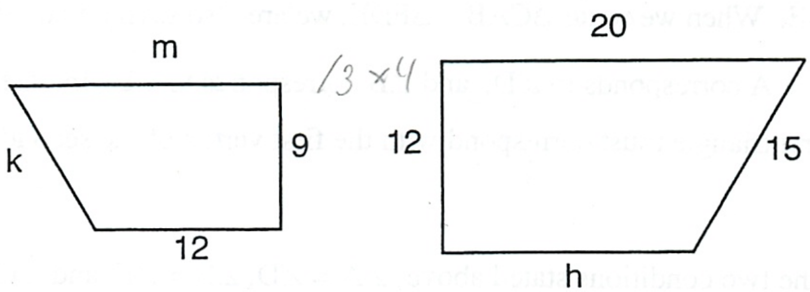
2.



3.

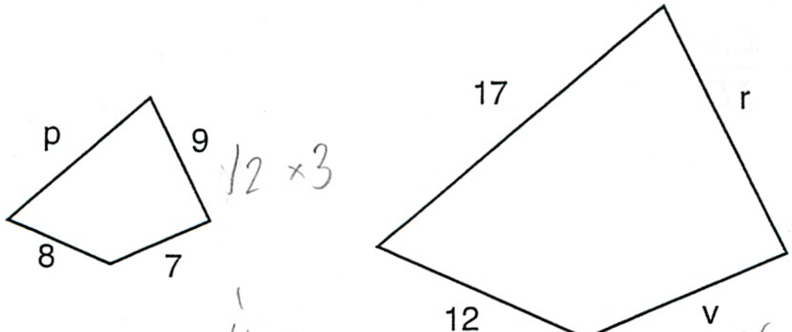


4.



3.75
$4\overline{)15}$
3.75
×3
11.25

5.



3.5
×3
10.5

4.5
×3
13.5

5.666
$3\overline{)17}$

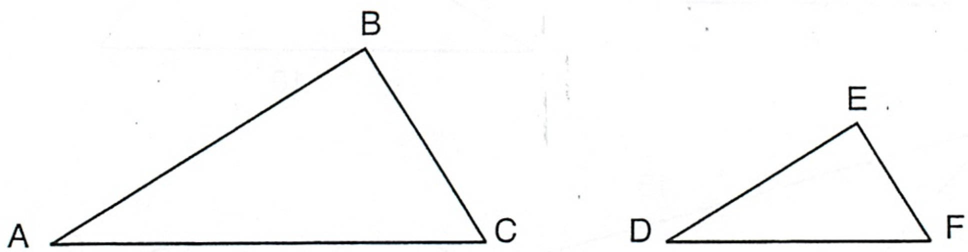
Answers

1. a 4
   b 5
2. c ~~6~~ $3\frac{2}{?}$
   d ~~2.2~~ 6
3. e 14
   f ~~14~~ 3.5
4. h 16
   k 11.25
   m 15
5. p ~~$5\frac{2}{3}$~~ $11\frac{1}{3}$
   r 13.5
   v 10.5

Polygons and Similarity

A **polygon** is named by naming its **vertices** in order. For example, the polygon at the right can be called "triangle ABC" or "triangle CBA" or "triangle BCA" or "triangle ACB" or "triangle CAB" or ""triangle BAC."

In the two triangles shown below, *angle A* ***corresponds to*** *angle D, angle B* ***corresponds to*** *angle E, and angle C* ***corresponds to*** *angle F.*



If two polygons are **similar**, it means they have the same shape. They might or might not be the same size.

Two polygons are similar if:
1. Corresponding angles are equal, and
2. Corresponding sides are proportional.

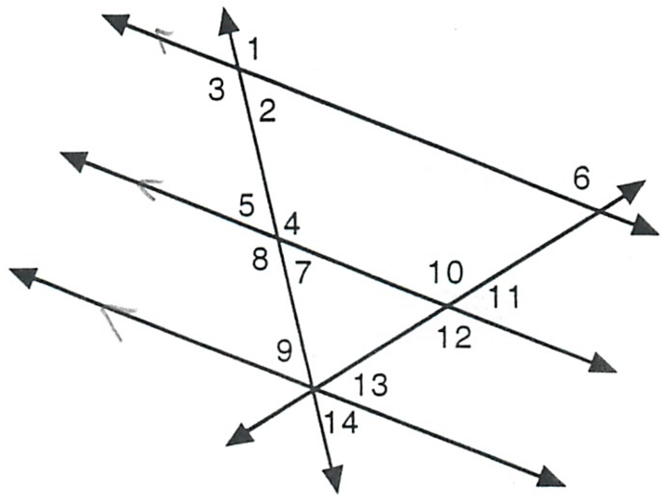
To indicate that triangle ABC is similar to triangle DEF, we write $\Delta ABC \sim \Delta DEF$. The symbol "~" is read "is similar to." We could also write $\Delta CAB \sim \Delta FDE$, but we could **not** write $\Delta ABC \sim \Delta FDE$. When we write $\Delta CAB \sim \Delta FDE$, we are also saying that $\angle C$ corresponds to $\angle F$, $\angle A$ corresponds to $\angle D$, and $\angle B$ corresponds to $\angle E$. In other words, the first vertex of the first triangle must correspond with the first vertex of the second triangle, and so on.

Also, according to the two conditions stated above, $\angle A = \angle D$, $\angle B = \angle E$, and $\angle C = \angle \cancel{E}F$,

and $\dfrac{AB}{DE} = \dfrac{BC}{EF} = \dfrac{CA}{FD}$.

Michael Plasmeier

Classify each pair of angles.



1) Angle 1 and angle 4 Corrsponding
2) Angle 3 and angle 4 alternate interior Angles ???
3) Angle 3 and angle 8 Corrsponding
4) Angle 5 and angle 7 vertical
5) Angle 2 and angle 5 alternate interior
6) Angle 6 and angle 10 Corrsponding
7) Angle 12 and angle 6 alternate exterior
8) Angle 14 and angle 9 vertical
9) Angle 13 and angle 11 corrsponding
10) Angle 9 and angle 7 alternate interior

Parallel Proof

p442+443

4/20

G: $\overline{AB} \parallel \overline{CD}$

P: Triangles sum to 180° (angles m∠s, m∠t and m∠r add to 180°

Statement	Reson
m∠x and m∠s are ≅	Alternate interior angles are ≅
m∠x, m∠r, m∠y add to 180°	~~share a line, or are adj to one that does~~ say
m∠s, m∠r, m∠y add to 180°	Substution
m∠y and m∠t are ≅	Alternate Interior angles are ≅
m∠s, m∠r and m∠t add to 180°	substution

say

m∠

measure of angle

say

2 or more adjecent angles making a line or whoes exterior rays are suplmentry

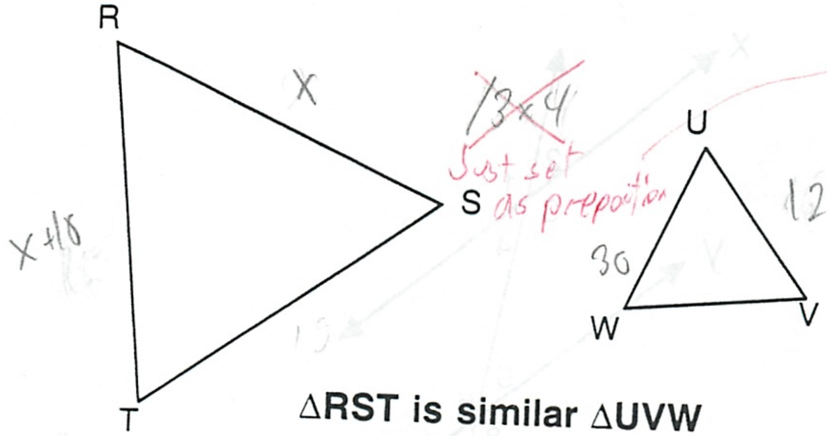
Classwork

Given: △CAB

Prove: m∠CAR = ∠ACB + ABC

Statement	Reson
△CAB	Given
∠CAR and ∠CAB are Supplementy	2 adj ∠'s w/ exterior rays form a line are supp.
m∠CAR + m∠CAB = 180°	Defintion* of supplmentry
m∠ACB + m∠BAC + m∠CBA = 180°	The sum of the measures of a triangle is 180°
m∠CAR + m∠CAB = m∠ACB + m∠BAC + m∠CAB	Transitive Property
m∠CAR = m∠ACB + m∠ABC	Subtraction property

Name Michael Plasmeier Shadow Practice



~~13×4~~ Just set as proportion

$\frac{9}{16}$ $\frac{x}{15}$ $\frac{16x}{16}=\frac{135}{16}$

$x=8\frac{7}{16}$

$\frac{x+10}{36}$ $\frac{x}{12}$ $12x+120=36x$

$-12x$ $-12x$

$\frac{120}{18}=\frac{18x}{18}$

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

180
−80
100
−30
70

ΔRST is similar ΔUVW

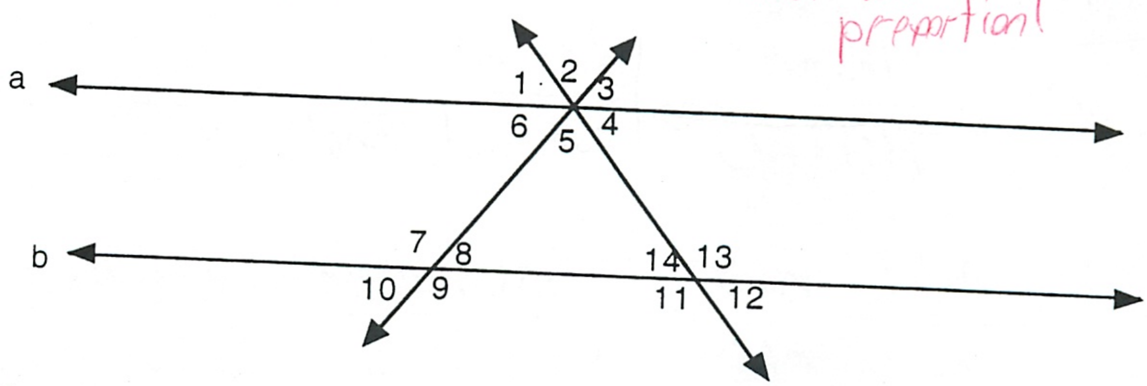
1) ∠R = 80°, ∠S = 30°. Find the measure of angle W. 70

2) RS = 9; RT = 15 and UV = 16. Find UW. $8\frac{7}{16}$

3) RS = x; UW = 30; RT = x + 10; UV = 12. Find RT.

$x=6\frac{2}{3}$ so, $16\frac{2}{3}$

Just use proportion



Given: a || b

Classify the given pair of angles. Write NONE if no classification exists.

4) angle 1 and angle 4

vertical

5) angle 6 and angle 8

alt. interior

6) angle 4 and angle 12

Corresponding

7) angle 3 and angle 8

Corresponding

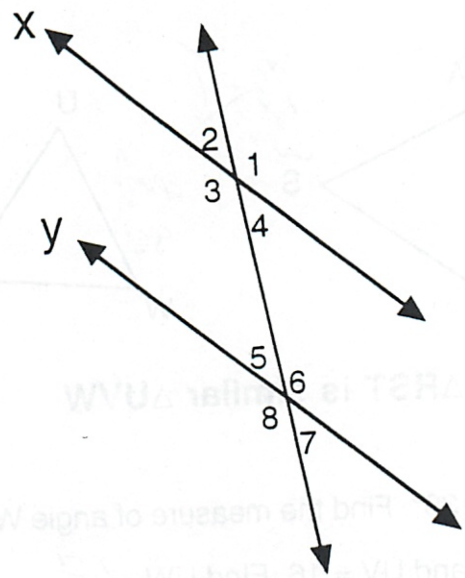
8) angle 6 and angle 11

N/A

9) angle 14 and angle 13

supplmentary

Given: x || y



Angle 1 and angle 7 are classified as same side exterior angles.
Prove (explain in words) that angle 1 and angle 7 are supplementary.

Statement	Reason
x || y	Given
$m\angle 1 = m\angle 3$	vertical angles are =
$m\angle 3 = m\angle 8$	corresponding angles are =
$m\angle 6 = m\angle 8$	vertical angles are equal
$m\angle 7 + m\angle 6 = 180°$	Share a common line (supplementary)
$m\angle 7 + m\angle 1 = 180°$	Sub or Tran Property ???

Forgot

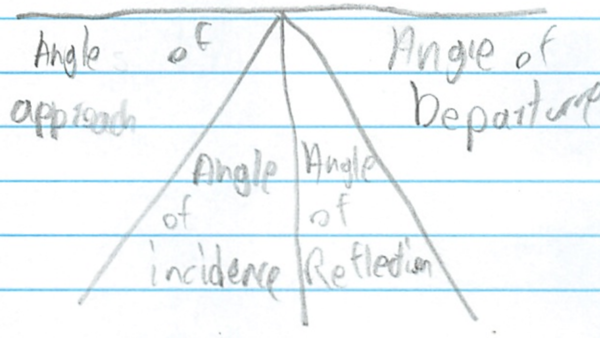
Ask

Said were 2 Trans at top, then sub at bottom

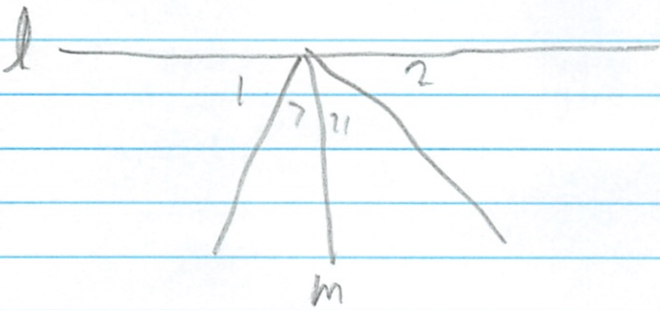
Light, Notes

Reflection

4/25



Principle of Light Reflection: when light is reflected off a surface, the angle of approach is = to the angle of departure



$m\angle 1 \cong \angle 2$

$l \perp m$

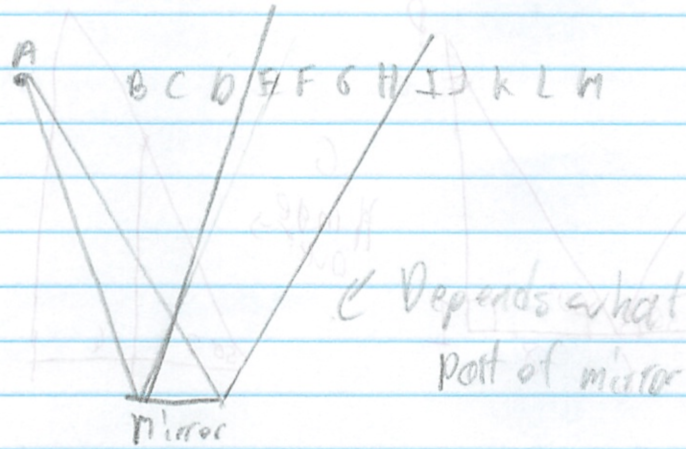
perpidecular (forms a 90° angle)

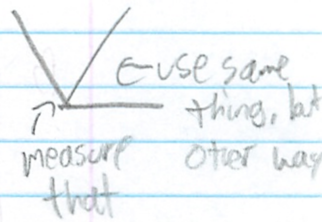
$\angle 7 \cong \angle 11$

$\angle 1$ and $\angle 7$ are complmentry

Now you see it #17

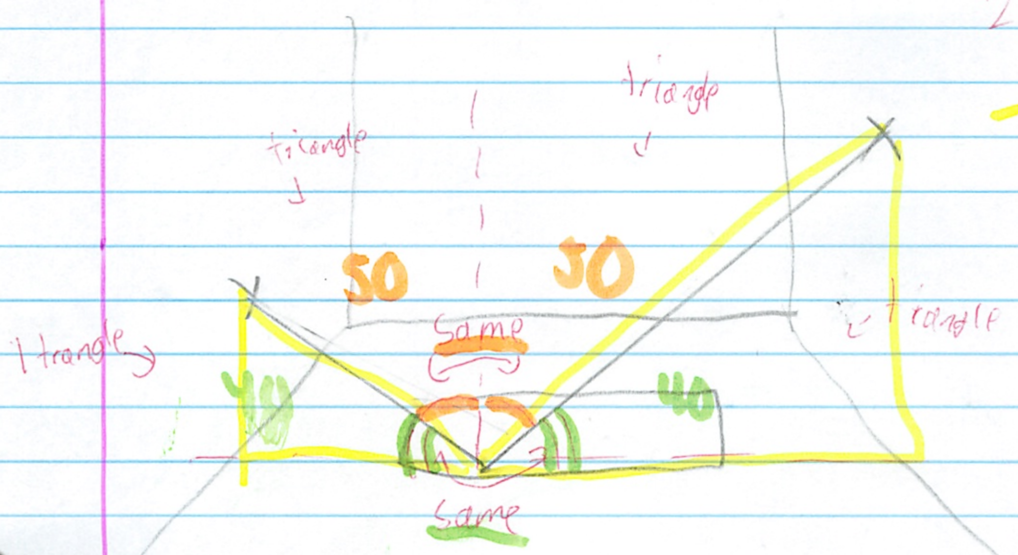
1. I think A can see E, F, G, H



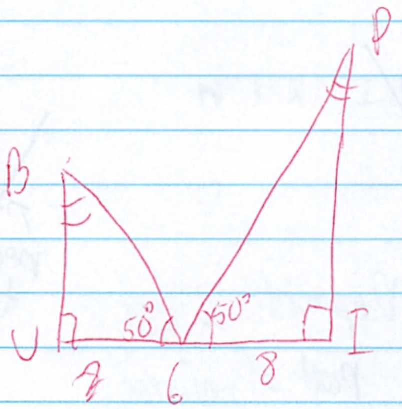


See principle of light reflection

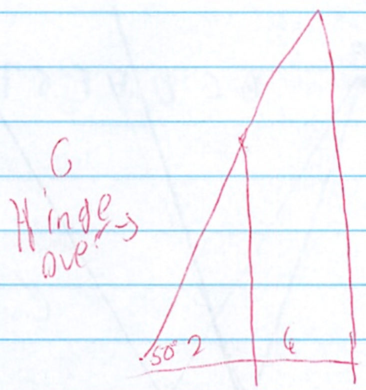
2 triangles on side =
2 in middle are =
— similar



Over →



B
P
U
I
50°
50°
7
6
8

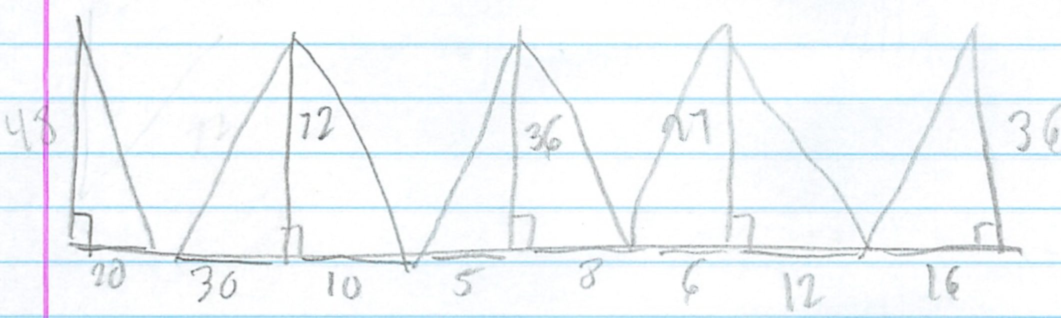


G
Hinge over
50°
2
6

Mirror Maddness #18

4/26

similar



48
24
72

36
72
72

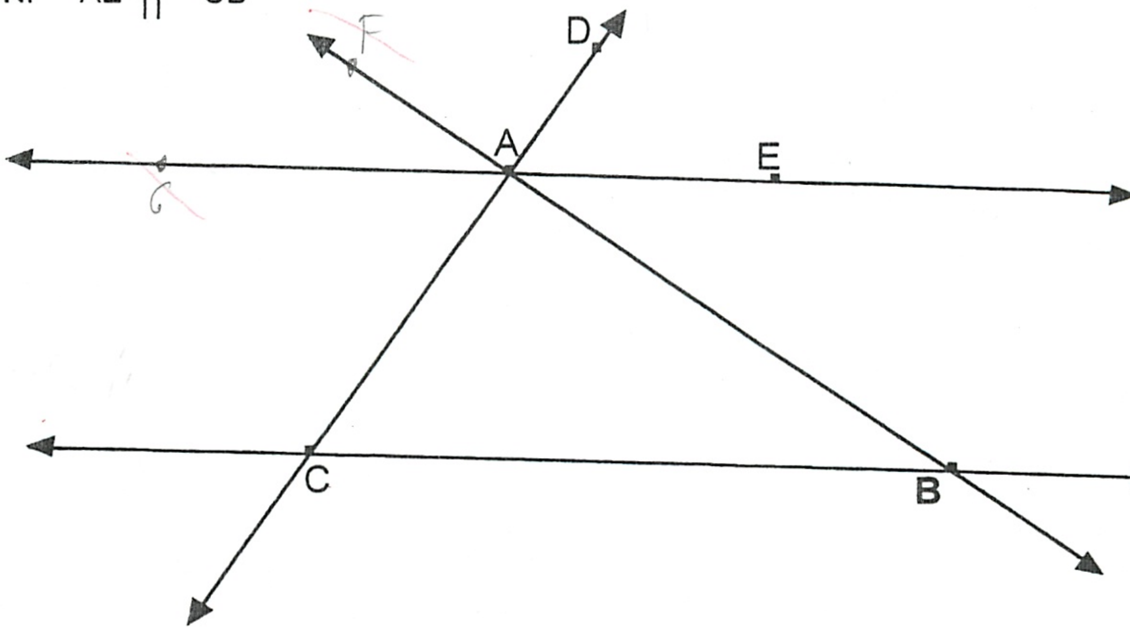
Sis Given = 48

Momma = 72in off ground
Uncle = 36
Baby = 27
Grandad = 36

I solved it by using principles of similar triangles

8)36

GIVEN: $\overleftrightarrow{AE} \parallel \overleftrightarrow{CB}$



Prove (explain in words) that the sum of the measures of ∠ACB and ∠ABC equals the measure of ∠DAB.

(All changed)

Statement	Reson
$\overline{AE} \parallel \overleftrightarrow{CB}$	Given
∠CAR + ∠CAB are suppl	2 adj w/ exterior rays are suppl.
m∠BAD + ∠CAB = 180°	Def of Suppl
mACB + mBAC + m∠CBA = 180°	Sum of measures of triangle is 180°
m∠BAD + m∠CAB = m∠ACB + m∠BAC + m∠CAB	Trans property
m∠BAD = m∠ACB + m∠ABC	Sub property

Statement	Reson
$\overleftrightarrow{AE} \parallel \overleftrightarrow{CB}$	Given
m∠ACB = m∠DAE	Corresponding Angles =
m∠CBA = m∠EAB	Alternate Interior angles are =
~~∠DAE + EAB = 90°~~	~~(Explain) 2 angles add to 90° supplementary~~
~~∠ACB + CBA = 90°~~	~~Substitution~~
∠DAB = 90°	??? Prove ?
∠ACB + CBA = DAB	Trans

Don't need it

Just

Don't know

w/o perpendicular lines, can't prove 90°

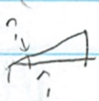
Statement	Reson
∠DAE + ∠BAE = DAB	Adj angle addition

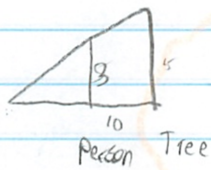
Statement	Reson

Measure a tree #19

how measure a tree

Like the shadows, If you know the distance from tree and Angle from your head to the top of the tree
+ distace from head to tree



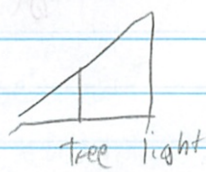


Or the entire shadow way,

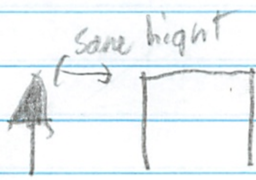
You could also throw a measure up to the top of the tree

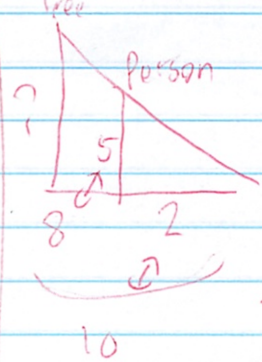
You could use a sight

You could measure the shadow of the tree



Or you could measure a buliding the same hight as the tree





$\frac{5}{2} = \frac{x}{10}$

$50 = 2x$

$25 = x$

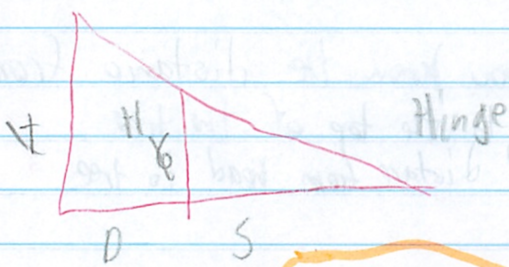
$? = 25$

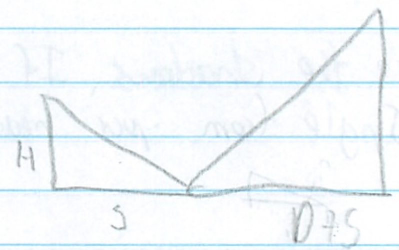
DQ

$\frac{10}{2} = \frac{x}{5}$

Cont→

Class 4/27





$$\frac{L}{H} = \frac{D+S}{S}$$

$$D+S(H) = L(S)$$

$$D(H) + S(H) = L(S)$$

try # $\frac{8(5) + 2(5)}{2} = \frac{25(2)}{2}$

$$4(2.5) + 5 = 25$$

$$\frac{1}{2}(D(H)) + H = L$$

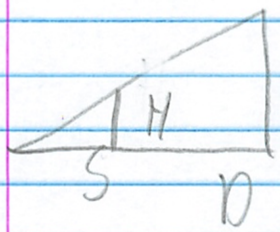
See chadow of dabt

Shadow of Doubt

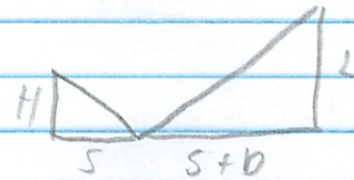
p458

4/27

1.



Hinge



2 similar triangles

2.

$$\frac{L}{H} = \frac{D+S}{S}$$

3.

$$\frac{11}{5} = \frac{12+s}{s}$$

$$60 + 5s = 11s$$
$$-5s \quad -5s$$
$$\frac{60}{6} = \frac{6s}{6}$$
$$10 = s$$

4

$$\frac{15}{5} = \frac{12+s}{s}$$

$$60 + 5s = 15s$$
$$-5s \quad -5s$$
$$\frac{60}{10} = \frac{10s}{10}$$
$$s = 6$$

5

$$\frac{15}{5} = \frac{60+s}{s}$$

$$300 + 5s = 15s$$
$$-5s \quad -5s$$
$$\frac{300}{10} = \frac{10s}{10}$$
$$30 = s$$

formula

$$\frac{L}{H} = \frac{D+S}{S}$$

$$H(D+S) = L(S)$$

$$HD + HS = LS$$ LS on 2 sides
$$-HS \quad -HS$$

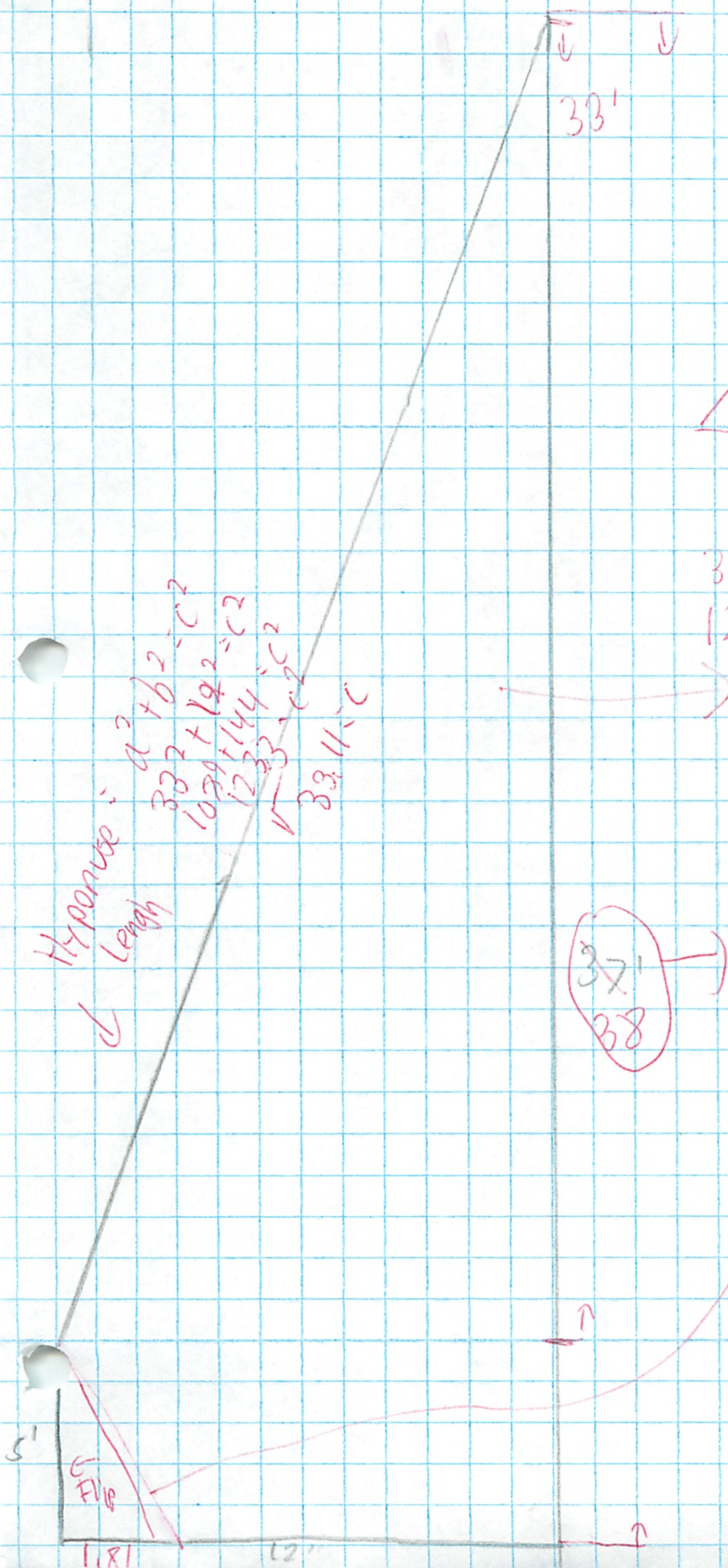
$$HD = LS - HS$$ factoring (reverse of distribution)
$$HD = S(L-H)$$
$$/(L-H) \quad /(L-H)$$

$$\frac{HD}{L-H} = S$$

6. Multiply H by D, add quanty of that to quanty of multiplied of S by H, This equals to L x S

1 Block = 1 Foot

Tan



Hypotenuse Length

$a^2+b^2=c^2$

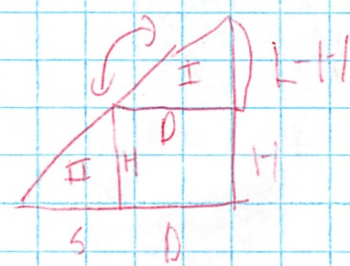
$33^2+12^2=c^2$

$1089+144=c^2$

$1233=c^2$

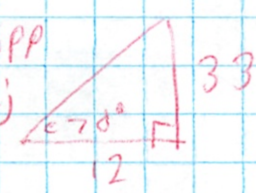
$\sqrt{\ } 33.11=c$

similar and large



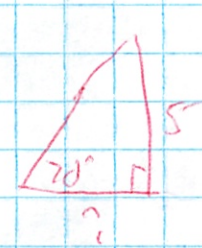
$33 = opp$

$12 = adj$



$Tan(\theta)$

$\frac{opp}{adj}$ $\frac{33}{12} = 2.75$



$2.75 = \frac{5}{?}$

$\times ?$ $\times ?$

$\frac{2.75?}{2.75} = \frac{5}{2.75}$

$? = 1.81$

$Tan(\theta) = \frac{opp}{adj}$

check whole triangle

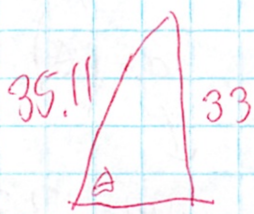
$\frac{38}{13.81} = 2.75 = \tan(70)$

Sin

$$\sin\theta = \frac{Opp}{Hyp}$$

$$= \frac{33}{35.11}$$

$$= .939$$

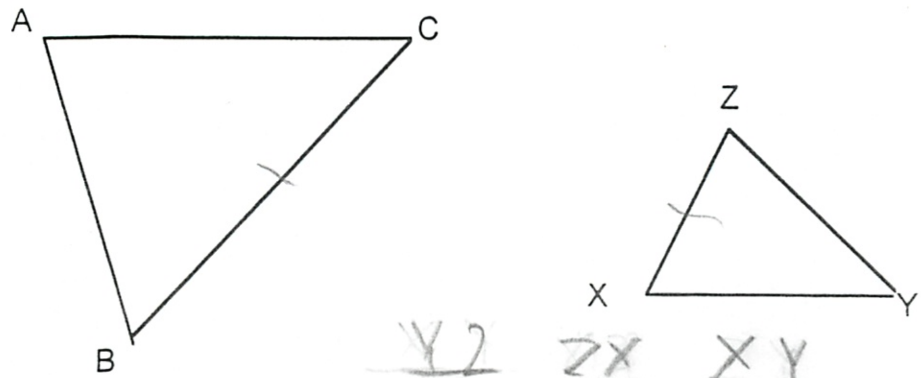


8848

Name Michael Plasmeier　　　　Shadows Quiz 2

Date 4/2　　　　50 points

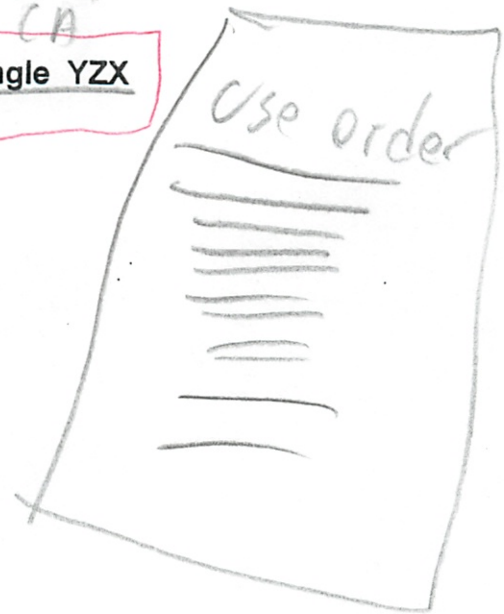
50 / 50



$\frac{YZ}{AB}$ $\frac{ZX}{BC}$ $\frac{XY}{CA}$

Very important

Triangle ABC is similar to Triangle YZX



1) $\angle A = 70°$ and $\angle B = 50°$, find $\angle X$.
{3 points}

$180 - 50 - 70 = 60°$

2) AB = 6, AC = 9, and YZ = 10. Find XY.
{3 points}

$\frac{10}{6}$ $\frac{x}{9}$ $\frac{90}{6} = \frac{6x}{6}$

$XY = 15$

3) AB = x, XY = 20, AC = x + 15, YZ = 5. Find AC.
{3 points}

$\frac{5}{x}$ $\frac{20}{x+15}$

$20x = 5x + 75$
$-5x \quad -5x$
$\frac{15x}{15} = \frac{75}{15}$
$x = 5$

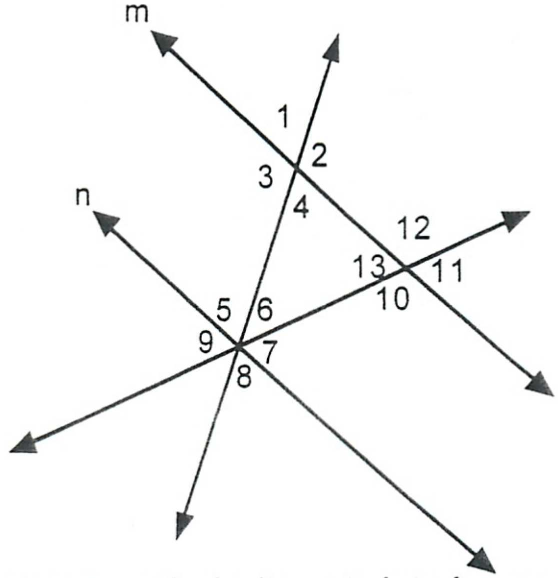
$x = 5$ → $20 = AC$

4) CB = 6, AC = 8, and YX = 15. Find ZX.
{3 points}

$\frac{x}{6}$ $\frac{15}{8}$ $\frac{8x}{8} = \frac{90}{8}$

$ZX = 11\frac{1}{4}$

Given: m || n



Classify each pair of angles as **vertical, alternate interior, or corresponding**.
{3 points each}

5) ∠1 and ∠4 vertical

6) ∠11 and ∠7 corresponding

7) ∠3 and ∠2 vertical

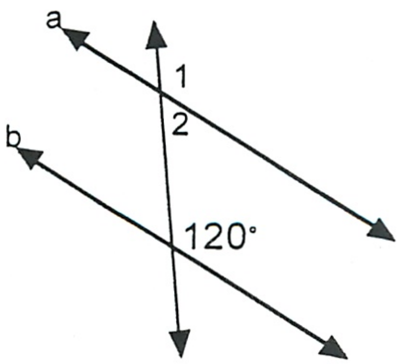
8) ∠1 and ∠5 corresponding

9) ∠4 and ∠5 alt. interior

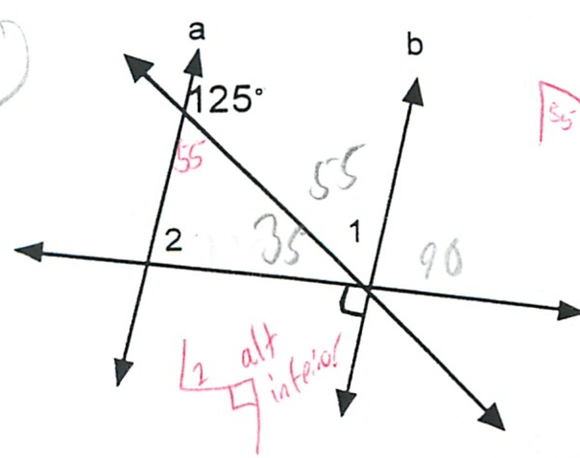
10) ∠13 and ∠7 alt. interior

In each of the following, line a is parallel to line b. Find the measure of angle 1 and angle 2. {6 points each}

11)



12)

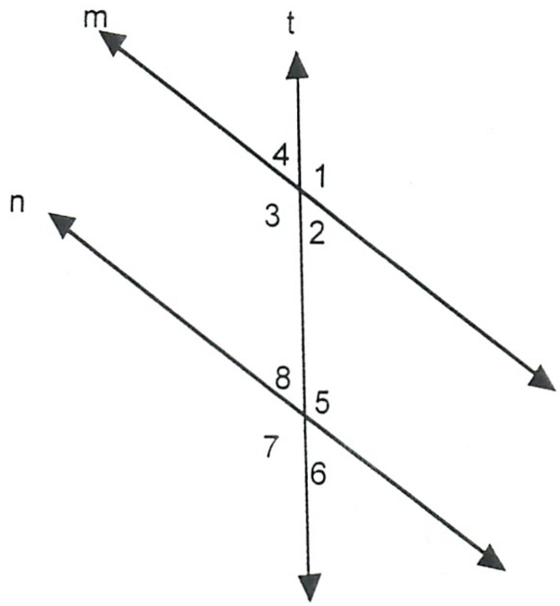


Angle 1 = 120° Angle 2= 60°

Angle 1 = 55 Angle 2 = 90

0

Given: m || n



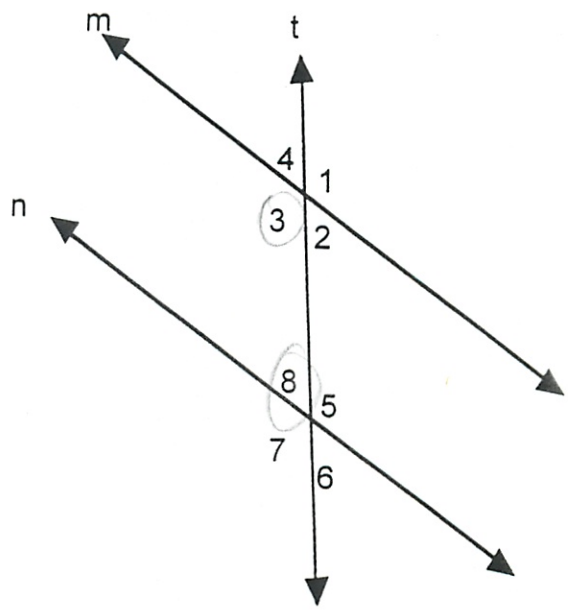
13) Angle 1 and angle 7 are classified as alternate exterior angles.
Prove (explain in words) that angle 1 has the same measure as angle 7.
{4 points}

Statement	Reason
m ll n	Given
$m\angle 1 = m\angle 3$	vertical angles are =
$m\angle 3 = m\angle 7$	corresponding angles are =
$m\angle 1 = m\angle 7$	Transitive property

0

Given: m || n

If A=B and B=C then A=C	If A=B and B+C=U then A+C=U
Transitive Property	Substitution



14) Angle 3 and angle 8 are classified as same side interior angles.
Prove (explain in words) that angle 3 and angle 8 are supplementary. {4 points}

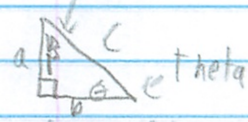
Statement	Reason
m∥n	Given
$m\angle 3 + m\angle 4 = 180°$	Share a ray that makes a line
or $\angle 3$ and $\angle 8$ are suppl	if 2 adj angles have ext ∠'s forming a line they are suppl.
$m\angle 7 + m\angle 8 = 180°$	Share a ray that makes a line
$m\angle 3 = m\angle 7$	Corresponding Angles are
$m\angle 4 = m\angle 8$	Corresponding Angles are =
$m\angle 3 + m\angle 8 = 180°$	Substitution

Don't Need

0

Pythagorean Thoreom
+ Tan + Sin + Cos

Pythagoran Thoreom $c^2 = a^2 + b^2$ is used <u>only</u> in right triangles

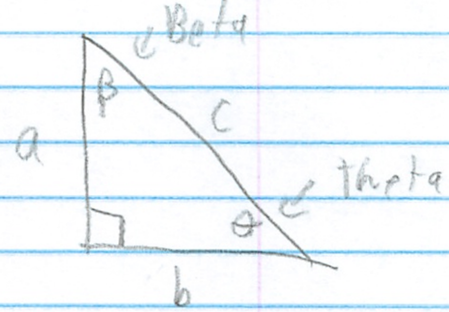


can also use to see if 3 #'s make a right triangle

$\tan(\measuredangle) = \frac{opp}{adj}$
any angle

$\tan(\theta) = \frac{opp}{adj} = \frac{a}{b}$

$\tan(\beta) = \frac{opp}{adj} = \frac{b}{a}$ for that figure



$\sin(\measuredangle)$ $\frac{opp}{hyp}$

$\sin(\theta) = \frac{opp}{hyp} = \frac{a}{c}$ for that

$\sin(\beta) = \frac{opp}{hyp} = \frac{b}{c}$

$\cos(\measuredangle) = \frac{adj}{hyp}$

$\mathrm{Con}(\theta) = \frac{adj}{hyp}$ $\frac{b}{c}$ for that

$\cos(\beta) = \frac{adj}{hyp} = \frac{a}{c}$

Memory trick:

<u>Sohcahtoa</u>
i p y o d y a p d
n p p s j p h p j

Right triangle Ratio #22

B

To check $\frac{10}{12}$ = .83 Then go $\boxed{\sin^{-1}}$(.83)

33.90
should be 55

$\frac{\text{Opp } A}{\text{Hyp}}$ $\frac{10}{12}$ $\frac{5}{6}$ .83

Cos(55) .57

$\frac{\text{adj } A}{\text{Hyp}}$ $\frac{6.5}{12}$ .54

Sin(55) .81

$\frac{\text{Opp } A}{\text{adj } A}$ $\frac{10}{6.5}$ 1.53

Tan(55) 1.42

Yes, I think everyone got the same result for ratio because it is Cos, Sin, Tan

A 55°

C

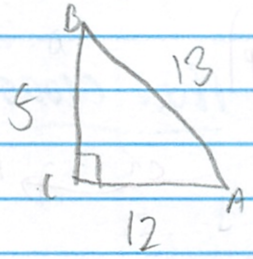
5, 12, 13

Trig Review

1. 2 smaller sides combined, bigger w/ third

2. P, Theorium $\quad 5^2 + 12^2 = 13^2$
h
a $\quad 24 + 144 = 169$
j
i
i
a
n

3. Sohcahtoa



Find a: $\quad$ Sin∠A $\frac{opp}{hyp}$ $\frac{5}{13}$

Sin∠A = $\frac{5}{13}$

~~Deg~~ mode $\quad$ Do $\boxed{5}$ $\boxed{\div}$ $\boxed{13}$ = .3846

Do $\boxed{2nd}$ $\boxed{Sin}$ .3846 = 22.61°

∠A = that

Sin $\frac{opp}{hyp}$

Cos $\frac{Adj}{hyp}$

tan $\frac{opp}{adj}$

Find Cos∠A = $\frac{adj}{hyp}$ $\frac{12}{13}$

Cos∠A = .9230

Reverse Cos

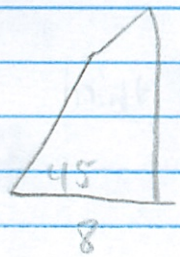
= 22.61 = m∠B

Find B: Tan∠B = $\frac{opp}{adj}$

$\frac{12}{5}$ = 2.4 Inverse → 67.38 = m∠B

Find m∠B if know A on Right triangles

m∠B = 90 - m∠A



~~$\frac{Adj}{Hyp} = \cos \angle 8$~~

Use Tan so

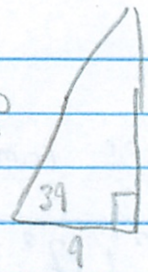
$\tan(45) = \frac{opp}{adj}$

$\tan(45) = \frac{opp}{8}$

Do this

$1 = \frac{x}{8}$

$1 = \frac{8}{8}$?·8



$\cos = \frac{Adj}{hyp}$

$\cos(39) = \frac{9}{p}$

Do

$(p).7771 = \frac{9}{p}(p)$ Now cross

4 → digits

ct → $\frac{.7771}{1} = \frac{9}{p}$

$\frac{.7771p}{.7771} = \frac{9}{.7771}$

$p = 11.58$

$.7771p = 9$

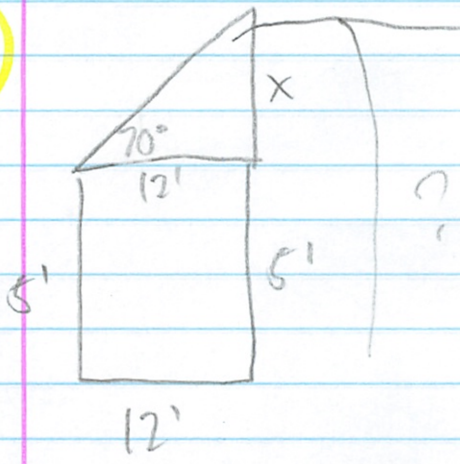
Then see

p468

tree + Pendulm

5/5

1.



Do other way

$(x)\tan(20) = \frac{12}{x}(x)$

$\frac{x(\tan 20)}{\tan 20} = \frac{12}{\tan 20}$

$x = \frac{12}{.3639}$

$x = 32.69$

know adj - need opp, so use tan

* notice 2 mentioned

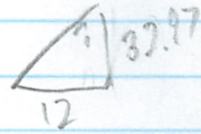
$(70)\tan(70) = \frac{x}{12}(70)$

$12(\tan 70) = x$

$12(2.74) = x$

$32.96 = x$

Need ∠



$\tan ? = \frac{12}{32.97}$

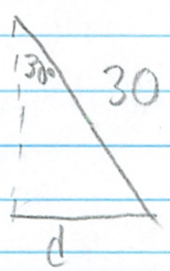
$\tan ? = .3639$

DO $\tan^{-1}(.3639)$ ← Inverse tan

19.99

$32.96 + 5 = 37.96$ ← hight of tree

2.



$\sin(30)\ \frac{opp}{hyp}$

$(30)\ \sin(30) = \frac{d}{30}(30)$

$30(\sin 30) = d$

$30(.5) = d$

$15 = d$

know hyp, need opp

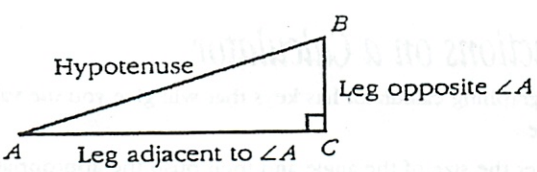
Sin, Cos, and Tan Buttons Revealed

Did you ever wonder what those keys on your calculator that say "sin," "cos," and "tan" are all about? Well, here's where you find out.

You've seen that, whenever two right triangles have another angle in common, the triangles must be similar, and so the corresponding ratios of lengths of sides within those triangles are equal.

These ratios depend only on that common acute angle, and each ratio of lengths within the right triangle has a name. The study and use of these ratios is part of a branch of mathematics called **trigonometry**.

Suppose you are given an acute angle (in other words, an angle between 0° and 90°). You can create a right triangle in which one of the acute angles is equal to that given angle. Suppose you label that triangle as shown in the diagram below, so that $\angle A$ is equal to the acute angle you started with.



The trigonometric ratios are then defined as explained on the following pages. The principles of similarity guarantee that these ratios will be the same for *every* right triangle that has an acute angle the same size as $\angle A$.

Sine of an Angle

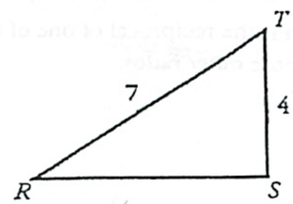
The **sine** of $\angle A$ is the ratio of the length of the leg opposite $\angle A$ to the length of the hypotenuse. The sine of $\angle A$ is abbreviated as **sin** A. For example, in ΔRST below, the leg opposite $\angle R$ has length 4, and the hypotenuse has length 7, so $\sin R = \frac{4}{7}$.

In summary

$$\sin A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}}$$

or simply,

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$



4/7 that and do inverse Sine

Cosine of an Angle

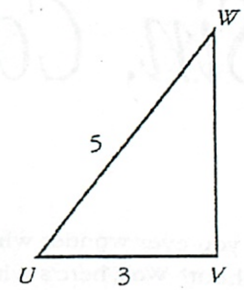
The **cosine** of $\angle A$ is the ratio of the length of the leg adjacent to $\angle A$ to the length of the hypotenuse. The cosine of $\angle A$ is abbreviated as **cos** A. For example, in ΔUVW below, the leg adjacent to $\angle U$ has length 3, and the hypotenuse has length 5, so $\cos U = \frac{3}{5}$.

In summary

$$\cos A = \frac{\text{length of leg adjacent to } \angle A}{\text{length of hypotenuse}}$$

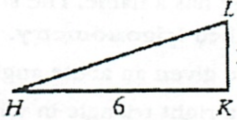
or simply,

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$



Tangent of an Angle

The tangent of $\angle A$ is the ratio of the length of the leg opposite $\angle A$ to the length of the leg adjacent to $\angle A$. The tangent of $\angle A$ is abbreviated as $\tan A$. For example, in ΔHKL on
s



$\tan A = \frac{2}{6} = \frac{1}{3}$

In summary

$$\tan A = \frac{\text{length of leg opposite } \angle A}{\text{length of leg adjacent to } \angle A}$$

or simply,

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

does that return measure for $\angle A$? or what?

Then do $\tan^{-1}(.33)$ and get the m of $\angle A$ $18°$

Trigonometric Functions on a Calculator

Any scientific calculator or graphing calculator has keys that will give you the values of these functions for any angle.

In some calculators, you enter the size of the angle and then push the appropriate trigonometric key, while for other calculators, you do the opposite.

doing $\tan(18)$ gives you ratio like .33
m of $\angle A$

Caution: You have been measuring angles using *degrees* as the unit of measurement, but there are other units for measuring angles. Most calculators that work with trigonometric functions have a *mode* key that you can set to "deg."

The Other Ratios

There are three other ratios of side lengths within a right triangle, in addition to the sine, the cosine, and the tangent. These other ratios are used less often and usually do not have their own calculator keys.

Each is the reciprocal of one of the three ratios already defined. Here are the definitions of those other ratios.

$$\text{cotangent } A = \frac{1}{\text{tangent } A}$$

or inverse of

$$\text{secant } A = \frac{1}{\text{cosine } A}$$

$\sin^{-1}$

not inverse

$$\text{cosecant } A = \frac{1}{\text{sine } A}$$

They are abbreviated, respectively, as $\cot A$, $\sec A$, and $\csc A$.

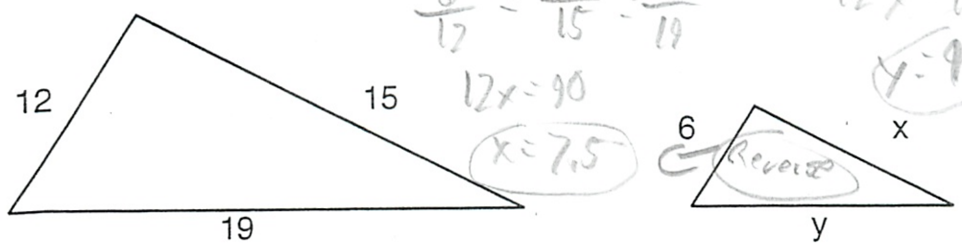
Michael Plasmeier

SHADOWS After Day 10 SIMILAR POLYGONS

In each of the pairs of figures below, assume the figures are similar and that they are facing the same way; that is, assume that the left side of one corresponds to the left side of the other, etc. In each case, do the following:

- Set up equations to find the lengths of the sides labeled by variables, and
- Find answers to the equations.

1.



$\frac{6}{12} = \frac{x}{15} = \frac{y}{19}$

$12x = 90$

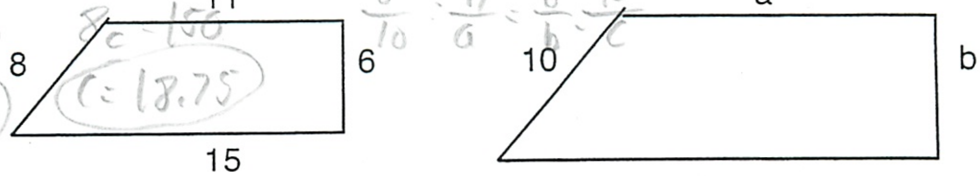
$x = 7.5$

Reverse

$12y = 114$

$y = 9.5$

2.

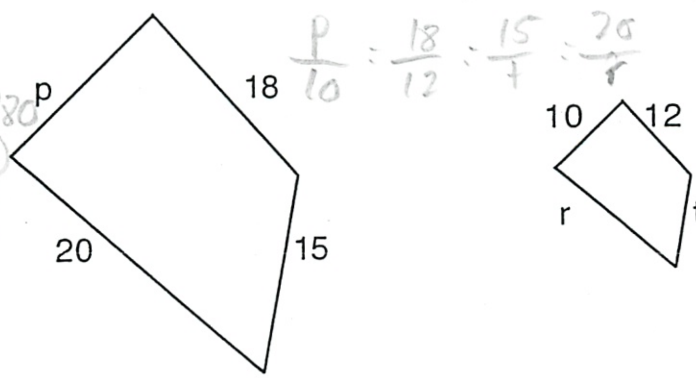


$\frac{8}{10} = \frac{11}{a} = \frac{6}{b} = \frac{15}{c}$

$8a = 110$ $8b = 60$ $8c = 150$

$a = 13.75$ $b = 7.5$ $c = 18.75$

3.



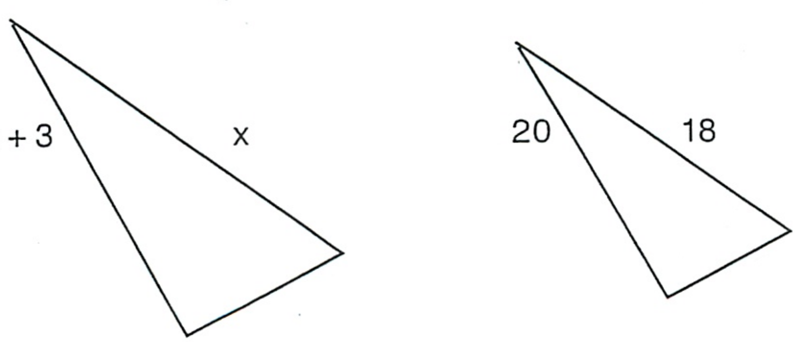
$\frac{p}{10} = \frac{18}{12} = \frac{15}{t} = \frac{20}{r}$

$180 = 12p$ $18t = 180$ $18r = 240$

$15 = p$ $t = 10$ $r = 13\frac{1}{3}$

C C

4.



$\frac{x+3}{20} \quad \frac{x}{18}$

$20x = 18(x+3)$

$20x = 18x + 54$

$-18x \quad -18x$

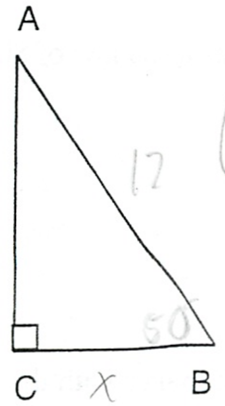
$2x = 54$

$x = 27$ $x + 3 = 30$

C C

TRIANGLE TRIGONOMETRY

Find all lengths to nearest tenth.



1. AB = 12, ∠B = 50°, AC = 9.19 BC = 7.71
2. BC = 8, ∠A = 43°, AC = 8.57 AB = 11.73

1 AC

$\sin(50) = \frac{x}{12}$

$12(\sin 50) = x$

$.776(12) = x$

$9.19 = x$

1 BC

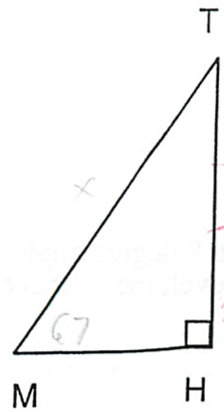
$\cos(50) = \frac{x}{12}$

$12(\cos 50) = x$

$12(.642) = x$

$7.71 = x$

Even Problems on looseleaf



3. HT = 5, ∠M = 67°, MT = 5.43 HM = 3.03
4. MT = 13, ∠T = 21°, HT = 12.13 HM = 41.65

3 HM

$\tan(67) = \frac{5}{x}$ ~~5~~ ← can't x(5) need x(x)

Easier to cross

$\frac{\tan 67}{1} = \frac{5}{x}$

$x(\tan 67) = 5$

$\frac{x(1.65)}{1.65} = \frac{5}{1.65}$

$x = 3.03$

3. MT

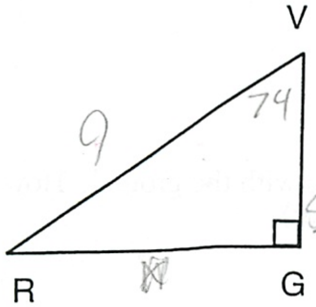
$\frac{\sin(67)}{1} = \frac{5}{x}$

$x(\sin 67) = 5$

$\frac{(x)\,.9205}{-.9205} = \frac{5}{-.9205}$

$x = 5.43$

Don't know shortcut yet



5. VR = 9, ∠V = 74°, GR = 8.65 GV = 2.48
6. GR = 26, ∠R = 13°, RV = 26.68 GV = 112.61

SGR 5GV

$\sin 74 = \frac{x}{9}$

$9(\sin 74) = x$

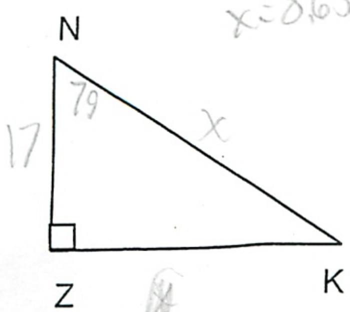
$9(.9612) = x$

$x = 8.65$

$\cos 74 = \frac{x}{9}$

$9(.2756) = x$

$x = 2.48$



87.5 89.1

7. NZ = 17, ∠N = 79°, KZ = ~~59.28~~ KN = ~~61.67~~
8. KZ = 4, ∠K = 60°, NZ = 6.92 KN = ~~2~~ 8

$\tan(74) = \frac{x}{17}$

$17(3.487) = x$

$x = 59.28$

$\cos(74) = \frac{17}{x}$

$(\cos 74)\,x = 17$

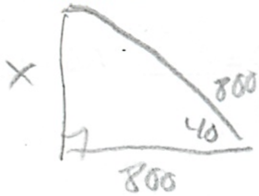
$\frac{.2756x}{.2756} = \frac{17}{.2756}$

$x = 61.67$

Can not be negative

For each problem, make a right triangular drawing labeled correctly with the given information and a variable for what you are trying to find. FORM A TRIG EQUATION, using sin, cos, or tan; THEN, write an equation that would find your variable. Using a calculator, find the solution to the question.

1. When the angle of elevation of the sun is 40 degrees, a building casts a shadow of 800 feet. How tall is the building?



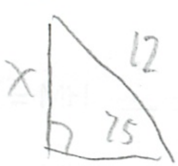
$\tan 40 = \frac{x}{800}$

$800(\tan 40) = x$

$800(.839) = x$

671.27 ft

2. How far up a vertical wall does a 12 foot ladder reach if the angle it makes with the ground is 75 degrees?



$\sin 75 = \frac{x}{12}$

$12(\sin 75) = x$

$.9659(12) = x$

11.59 x

3. The operator of a lighthouse spots a sailboat on a line that makes an 8 degree angle with the horizontal. If the top of the lighthouse is 25 meters above sea level, the sailboat is how far away from the base of the lighthouse?

$\tan 8 = \frac{25}{x}$

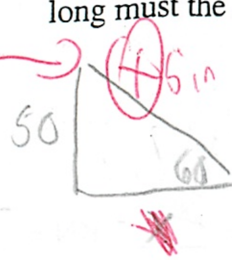
$(\tan 8)x = 25$

$\frac{.1405x}{.1405} = \frac{25}{.1405}$

$x = 177.88$ m away

4. A support cable for a 50 ft. tower is to make a 60 degree angle with the ground. How long must the cable be? (The cable goes to the top of the tower).

problem was put x in wrong place



$\cancel{\tan}(60) = \frac{50}{x}$

$(\tan 60)x = 50$

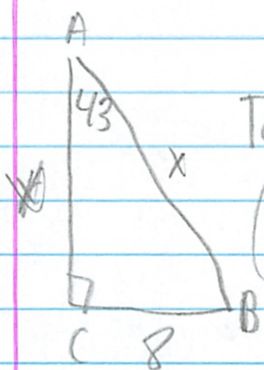
$\frac{1.732x}{1.732} = \frac{50}{1.732}$

$x = \cancel{28.86}$ ft 57.7

Even Problems

Shadows 16

2.



$\tan(43) = \frac{8}{x}$

$(\tan 43)x = 8$

$\frac{.9325x}{.9325} = \frac{8}{.9325}$

$x = 8.57$

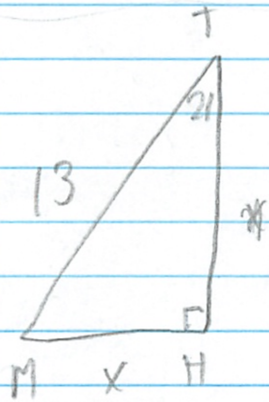
$\sin(43) = \frac{8}{x}$

$(\sin 43)x = 8$

$\frac{.6819x}{.6819} = \frac{8}{.6819}$

$x = 11.73$

4.



$\cos(21) = \frac{x}{13}$

$13(\cos 21) = x$

$.9335(13) = x$

$12.13 = x$

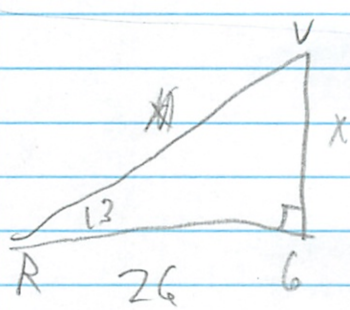
$\sin(21) = \frac{x}{13}$

$13(\sin 21) = x$

$13(.3583) = x$

4.65

6.



$\cos(13) = \frac{26}{x}$

$x(\cos 13) = 26$

$\frac{.9743x}{.9743} = \frac{26}{.9743}$

$x = 26.68$

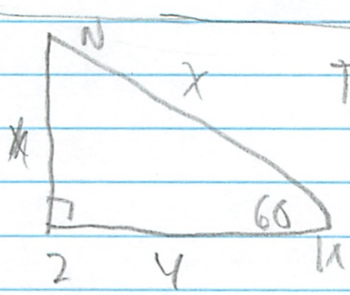
$\tan(13) = \frac{26}{x}$

$(\tan 13)x = 26$

$\frac{.2308x}{.2308} = \frac{26}{.2308}$

$x = 112.61$

8.



$\tan 60 = \frac{x}{4}$

$4(\tan 60) = x$

$1.732(4) = x$

$6.928 = x$

$\cos 60 = \frac{4}{x}$

$(\cos 60)x = 4$

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

$x = 2$

Opposite/Adj #24

5/8

1. They must both add to 90°

$\angle A$ and $\angle B$ are Complmentry (add 90)

2. $\frac{BC}{AB}$ for $\angle B$ $\frac{Adj}{hyp}$ or $\cos \angle B$ } are =

For $\angle A$ $\frac{opp}{hyp}$ or $\sin \angle A$

3. The Sin of 90° - an acute angle in a right triangle is the Cos of the other acute angle

90° - the Cos of an acute angle in a right triangle is the Sin of the other acute $\angle$.

An $\cos \angle B = \sin \angle A$

$m\angle A + m\angle B = 90°$

$\sin \angle A = \cos(90 - \angle A)$

$m\angle B = 90° - m\angle A$

Example $\sin 30° = \cos(90-60)$

$\sin 30 = \cos 60$

$.5 = .5$

✓

Name [illegible] Shadows Quiz 3

Date [illegible] 5/1/05 [illegible] 55 points

$\frac{49}{55}$ -6

89% B

Solve each proportion for x. Show all work for full credit! {3 points each}

1) $\frac{5}{8} = \frac{x}{12}$

$5 \times 12 = 8x$

$\frac{60}{8} = \frac{8x}{8}$

$7.5 = x$

2) $\frac{4}{x} = \frac{x}{4}$

$x^2 = 4 \times 4$

$x^2 = 16$

$\sqrt{\ } \quad \sqrt{\ }$

$x = \pm 4$

-1

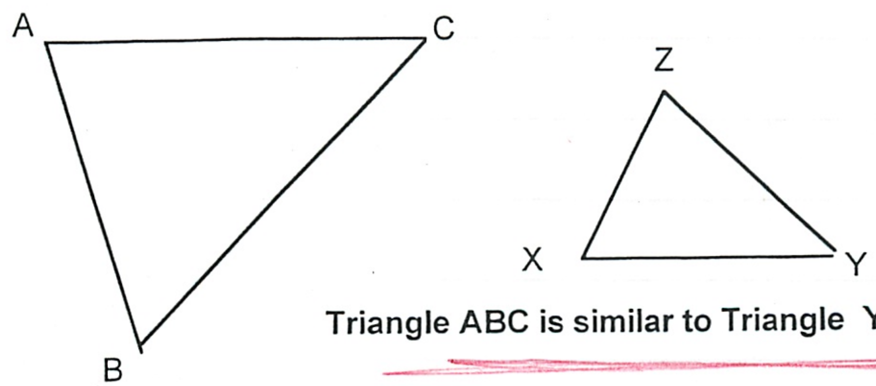
3) $\frac{x}{x+2} = \frac{2}{3}$

$3x = 2(x+2)$

$3x = 2x + 4$

$-2x \quad -2x$

$x = 4$



Triangle ABC is similar to Triangle YZX

$\frac{AB}{YZ} = \frac{BC}{ZX} = \frac{CA}{XY}$

4) $\angle A = 70°$ and $\angle B = 50°$, find $\angle X$.
{3 points}

$180 - 70 = 110$

$110 - 50 = 60$

$m\angle X = 60$

5) AB = 6, AC = 9, and YZ = 10. Find XY.
{3 points}

$\frac{6}{10} = \frac{9}{x}$

$\frac{6x}{6} = \frac{90}{6}$

$\overline{XY} = 15$

6) AB = x, XY = x, AC = 20 , YZ = 5. Find AB.
{3 points}

$\frac{x}{5} = \frac{20}{x}$

$x^2 = 100$

$\sqrt{\ } \quad \sqrt{\ }$

$x = 10$

$\overline{AB} = 10$

7) CB = 6, AC = 8, and YX = 15. Find ZX.
{3 points}

$\frac{6}{x} = \frac{8}{15}$

$8x = 6(15)$

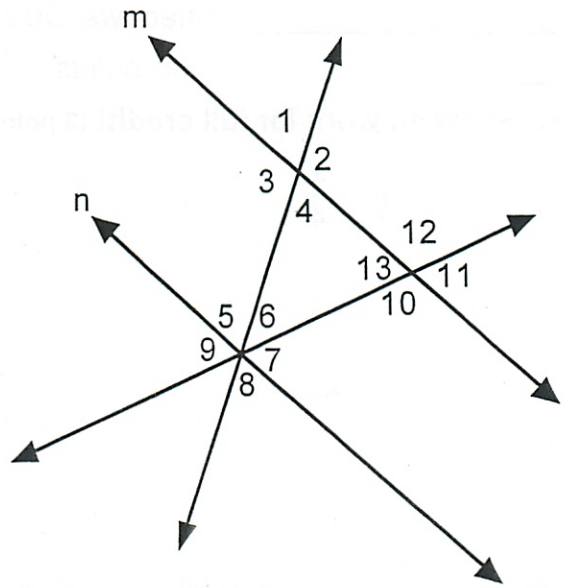
$\frac{8x}{8} = \frac{90}{8}$

$x = 11.25$

$\overline{ZX} = 11\frac{1}{4}$

1

Given: m || n



Classify each pair of angles as **vertical, alternate interior, or corresponding.**
{3 points each}

8) ∠1 and ∠4 vertical

9) ∠11 and ∠7 corresponding

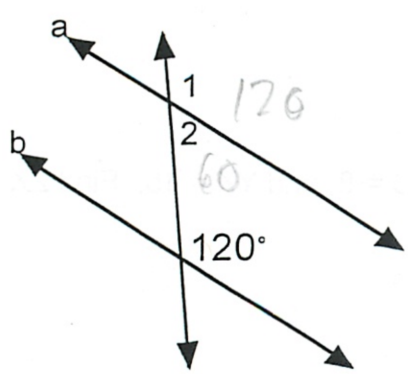
10) ∠3 and ∠2 vertical

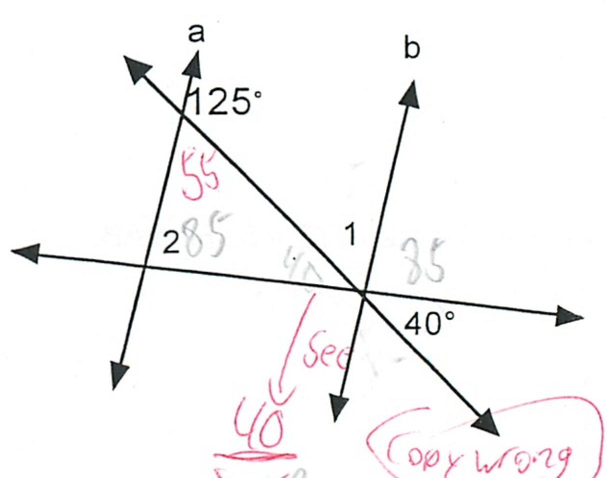
11) ∠1 and ∠5 corresponding

12) ∠5 and ∠4 alt. interior

13) ∠13 and ∠7 alt. interior

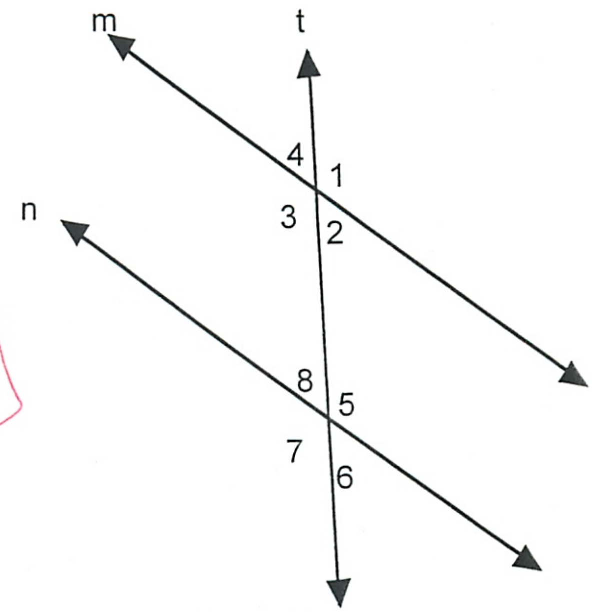
In each of the following, line a is parallel to line b. Find the measure of angle 1 and angle 2.
{3 points each}





14) Angle 1 = 120° 15) Angle 2= 60° 3 16) Angle 1 = ~~45°~~ 40 17) Angle 2 = 85°

Given: m || n



~~Say~~

G: m||n

P: ∠3 + ∠8 are suppl

18) Angle 3 and angle 8 are classified as same side interior angles.
Prove (explain in words) that angle 3 and angle 8 are supplementary. {4 points}

Statement	Reason
m || n	Given
∠3 and ∠4 are suppl	Adj angles share a line
∠7 and ∠8 are suppl	adj angles share a line
m∠4 and m∠8 are ≅	Corresponding angles
∠3 and ∠8 are suppl	~~transitive property~~

2 adj angles w/ exterior rays forming a line are suppl

Don't need!

-2

Substution

2

Grading for Pow 17

diagrams!

Michael Plosmeier

4/25

Points

1. **Process**
   - unrelated to the problem-- 2
   - incomplete - no work, tables, or diagrams shown------------------------------------- 5
   - complete - minor gaps in process explanation-- 7
   - complete - explanation with examples, charts, tables, and work shown---------- 10

ok

2. **Solution**
   - wrong answers- no explanation and not defended------------------------------------ 2
   - correct answers- no explanation or proof of answer being correct---------------- 4
   - wrong answers - with explanation--- 6
   - partially correct answers - some values correct / some incorrect----------------- 8
   - correct - complete explanation and well supported--------------------------------- 10

TOTAL POINTS (20) 0