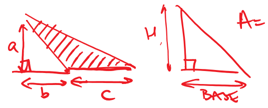
HW 5.1 Solution

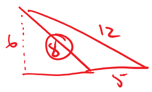
March 24, 2015 11:06 PM

Triangles:

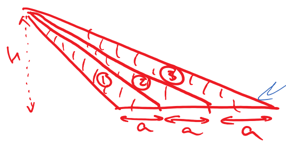


$A = \frac{b \times H}{2}$

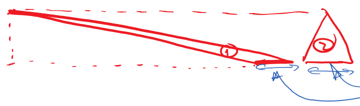
$A = \frac{a \times c}{2}$



① When two triangles have equal bases and heights of equal lengths, their areas will then be equal.

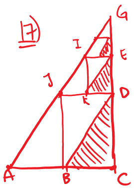


The 3 triangles share the same height and have equal bases, so the areas of all 3 triangles are equal.



② Same here! If the bases are equal, the have the same height, their areas are also equal.

17)



Geometric Sequences and Series

$8+4+2+1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}$

$a, ar, ar^2, ar^3, ar^4, \cdots ar^{n-1}$

$t_1 \quad t_2 \quad t_3 \quad t_4 \quad \cdots \quad t_n$

$\boxed{t_n = a \times r^{n-1}}$

$\boxed{S_n = \frac{a \times (r^n - 1)}{r-1}}$

To solve this question, we need to know what a geometric sequence is.

Crash Course:

$\boxed{S_n = \frac{a(r^n - 1)}{r-1}}$

Sum of all 'n' terms

'a' → value of 1st term

'r' common ratio.

$1+2+4+8+16+32+64+\cdots$

a = value of 1st term $a=1$

r: common ratio $r=2$

n = number of terms $n=15$

$t_{15} = a \times r^{n-1}$

$= (1)(2)^{15-1}$

$= (1)(2)^{14}$

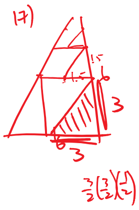
$= \$16384$

$S_{15} = \frac{a \times (r^n - 1)}{r-1} = \frac{(1)(2^{15}-1)}{2-1}$

$= 2^{15} - 1 = 32768 - 1$

$= \$32,767$

17)



$\frac{3(3)}{2} + \frac{(1.5)(1.5)}{2} + \frac{(0.75)(0.75)}{2} +$

$= 4.5 + 1.125 + 0.28125$

$= \frac{9}{2} + \frac{9}{8} + \frac{9}{32} + \frac{9}{128}$

$\times\frac{1}{4} \quad \times\frac{1}{4} \quad \frac{1}{4}$

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

$a = \frac{9}{2} \quad r = \frac{1}{4} \quad n = 100$

$\left(\frac{1}{4}\right)^{100} = \frac{1^{100}}{4^{100}} = 0.25^{100}$

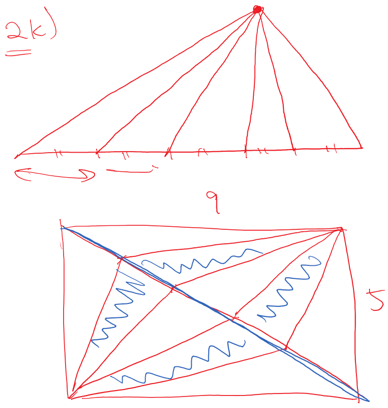
$S = \frac{a(r^n - 1)}{r-1} \qquad S = \frac{a}{1-r}$

$= \frac{\left(\frac{9}{2}\right)\left(\left(\frac{1}{4}\right)^{100} - 1\right)}{\frac{1}{4} - 1} = \frac{\frac{9}{2}(-1)}{\left(-\frac{3}{4}\right)}$

$= \frac{9}{2} \div \frac{3}{4} = \frac{9}{2} \times \frac{4}{3} = 6$

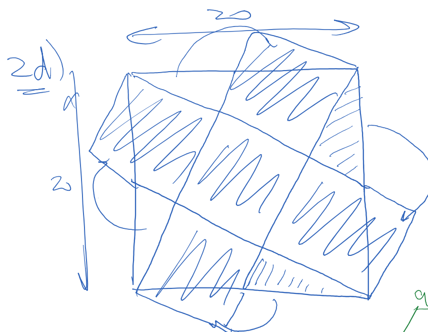
Well, the answer is '6', I'll see if I can come up with an easier solution!

2k)



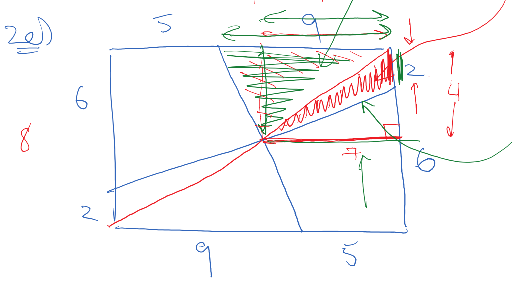
$\frac{2}{5} \cdot \frac{4}{10} \times 45^{9} = 18$

2d)



$\frac{400}{5} = 80$

2e)

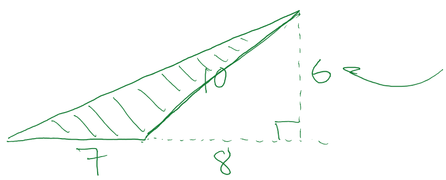


$\frac{9 \times 4}{2} = 18$

$\frac{2 \times 7}{2} = 7$

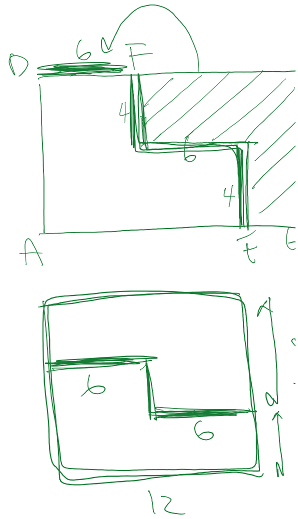
14

Area $= 18 + 7$
$= 25$

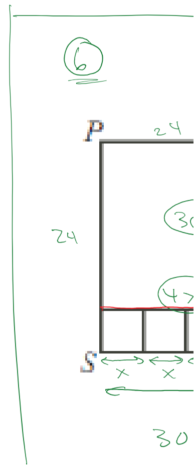


Base = 7 Height = 6

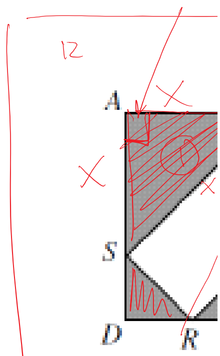
5)

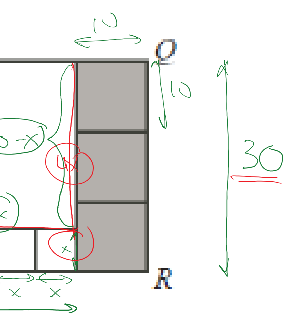


6)



12



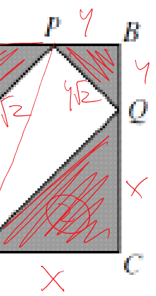


$30 - x = 4x$

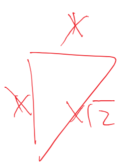
$30 = 5x$

$\boxed{6 = x}$

SIDE LENGTH = 24.



$x^2 + y^2 = 200.$



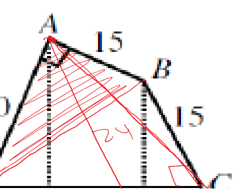
$(x\sqrt{2})^2 + (y\sqrt{2})^2 = PR^2$

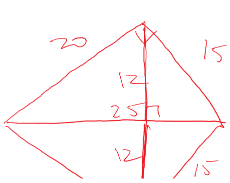
$2x^2 + 2y^2 = PR^2$

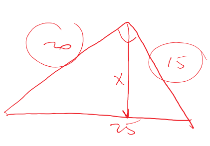
$2(x^2 + y^2) = PR^2$

$400 = PR^2$

$\boxed{20 = PR}$







$15(20) = 25(x)$

$= \frac{9}{2} \div \frac{3}{4} = \frac{\cancel{9}^{3}}{\cancel{2}_{1}} \times \frac{\cancel{4}^{2}}{\cancel{3}_{1}} = 6$

If I can come up with an easier solution!

$$S = \frac{a(r^n - 1)}{r - 1}$$

$$S_n = a + ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1}$$

$$r \times S_n = ar + ar^2 + ar^3 + ar^4 + \dots + ar^{n-1} + ar^n$$

$$S_n - rS_n = a - ar^n$$

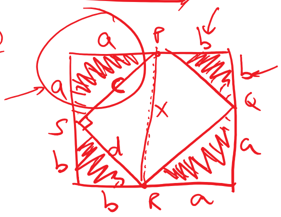
$$S_n(1-r) = a - ar^n$$

ZERO

$$S_n = \frac{a(1-r^n)}{1-r} = \frac{a(r^n-1)}{r-1}$$

$$\boxed{S_\infty = \frac{a}{1-r}}$$

12)



Use the pythagorean property

$a^2 + a^2 = c^2 \quad b^2 + b^2 = d^2$

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

$2(a^2 + b^2) = x^2$ pyth.

$2(200) = x^2$

$400 = x^2$

$\boxed{20 = x}$

① $a^2 + b^2 = 200$

$a^2 + a^2 = c^2 \quad b^2 + b^2 = d^2$

$c^2 + d^2 = x^2$

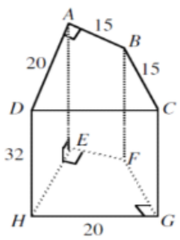
$2a^2 + 2b^2 = x^2$

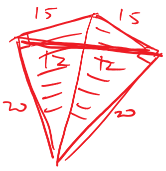
$400 = x^2$

16) Volume Prism:

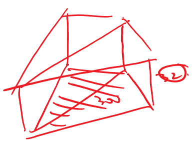
$V = (\text{Area of BASE}) \times H$

IGNORE THIS!

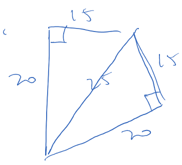


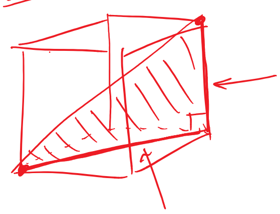


① FIRST STEP IS FIND THE LENGTH ACROSS FROM A to C.

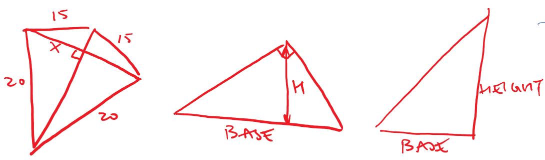


② THE TOP IS MADE UP OF 2 R.T.

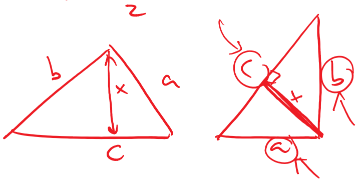




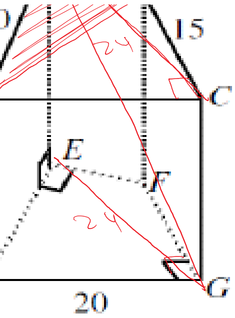
IT'S THE ALTITUDE OF A R.T. THEN TIMES 2!

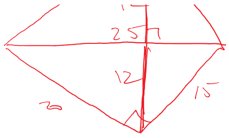


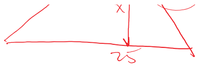
$A = \frac{\text{BASE} \times \text{HEIGHT}}{2}$



③ THIS IS HOW YOU DO IT!



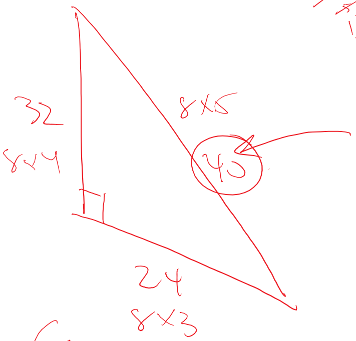


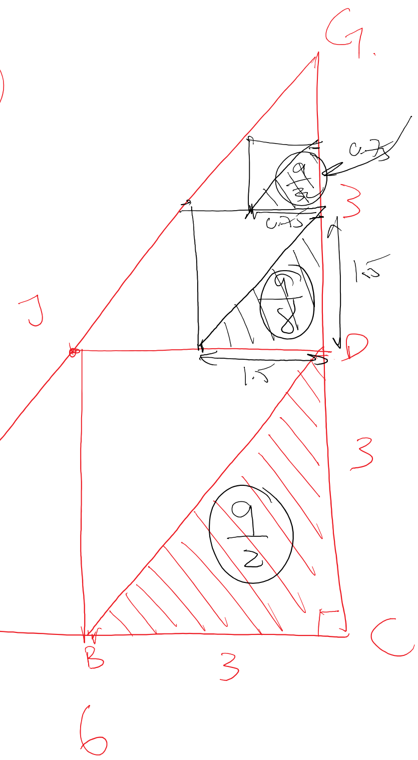


$\frac{15(20)}{x} = \frac{25(x)}{x}$

$\frac{3 \cancel{15}(\cancel{20})}{\cancel{25}} = x$

$\boxed{12 = x}$





$\frac{3}{2} \times \frac{3}{2} \times \frac{1}{2} \quad \frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$

6

$\times\frac{1}{4} \quad \times\frac{1}{4} \quad \times\frac{1}{4} \quad \times\frac{1}{4} \quad \times\frac{1}{4}$

$$\boxed{\frac{9}{2} + \frac{9}{8} + \frac{9}{32} + \frac{9}{128} + \frac{9}{512}}$$

① THIS IS A GEOMETRIC SEQUENCE WITH HOW MANY TERMS? 100

Formula for sum of a Geometric ~~SERIES~~ SERIES:

$$a + ar + ar^2 + ar^3 + ar^4 + \cdots ar^{n-1}$$

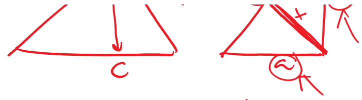
$\times r \quad \times r \quad \times r$

n terms

$$\boxed{S = \frac{a(r^n - 1)}{r - 1}} = \frac{\left(\frac{9}{2}\right)\left[\left(\frac{1}{4}\right)^{100} - 1\right]}{\frac{1}{4} - 1} = \frac{\left(\frac{9}{2}\right)(-1)}{(-0.75)}$$

$$\frac{\cancel{9}^{3}}{\cancel{2}} \times \frac{\cancel{4}^{2}}{\cancel{3}} = 6$$

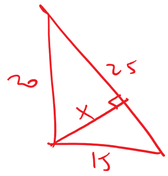
=



$$\frac{c \cdot x}{\cancel{2}} = \frac{a \cdot b}{\cancel{2}}$$

$$\boxed{x = \frac{ab}{c}}$$

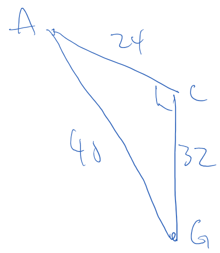
Now you do it! Finding the altitude!



$$x = \frac{15(20)}{25}$$

$$\boxed{x = 12}$$

(4) So just use the pythagorean theorem. To find $\overline{AG}$



3, 4, 5

24, 32, 40

$\overline{AG} = 40$