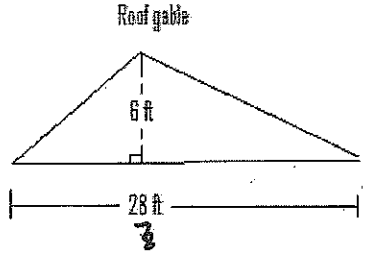
Unit 1 Review
Geometry in Construction

Name_____

1. Find the area of these building objects.

a)

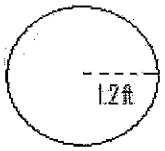
$A = 14 \cdot 6$ 84 sq. ft



b) $A = \pi (1.2)^2$

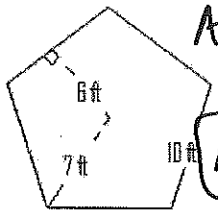
$A = 4.52$ sq. ft

window



c) $A = \frac{a \cdot P}{2}$

regular pentagon deck



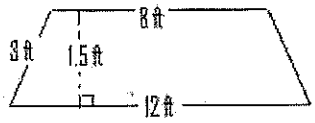
$A = \frac{6 \cdot 50}{2}$

$A = 150$ sq. ft

$P = 50$ ft

d)

Trapezoidal Bay Window floor

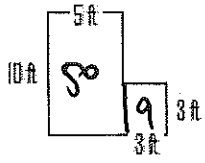


$A = \frac{1}{2}(1.5)(12+8)$

$A = 15$ sq. ft

e)

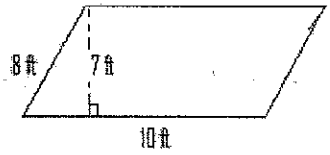
Bath



59 sq. ft

f)

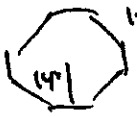
Parallelogram Play yard



$A = b \cdot h$

$A = 70$ sq. ft

2. Find the area of a stop sign which is a regular octagon. Each side is 12 inches and the apothem is 14 inches.



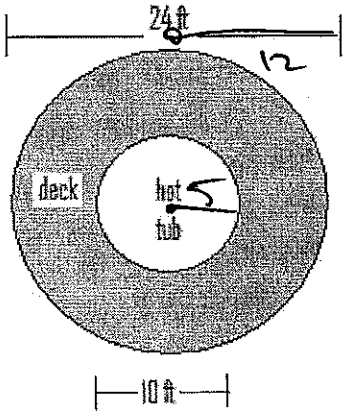
$P = 12 \cdot 8$

$P = 96$

$A = \frac{a \cdot P}{2} = \frac{14 \cdot 96}{2}$

$= 672$ sq. in

3. What is the area of the deck surrounding the hot tub.



$Big = \pi(12)^2$

$= 144\pi$

$Little = \pi(5)^2$

$= 25\pi$

$A = 144\pi - 25\pi$

$= 373.85$ sq. ft

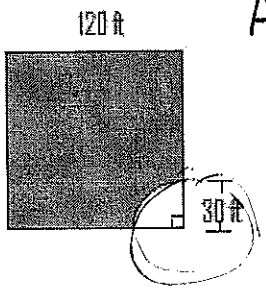
4. An 8' by 8' wall is being tiled with 4" by 4" tiles. How many tiles do you need?

$96" \times 96" = 9216$

$\frac{9216}{16}$

576 tiles

5. Find the area of the grass (shaded) portion of the baseball field. The field is a square.



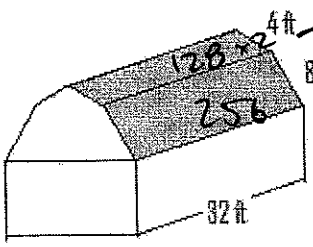
$A_{\square} = 120 \cdot 120 = 14{,}400$

$A = \frac{\pi(30)^2}{4} = 706.86$

$A = 14{,}400 - 706.86$

$A = 13693.14$ sq. ft

6. Find the surface area of the roof (shaded part). Remember that there are two sides to the roof.



$4 \text{ ft} \rightarrow 256$

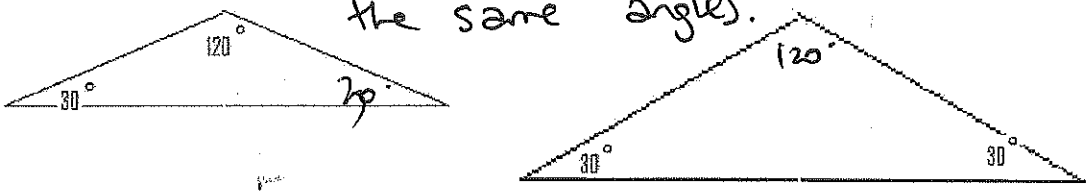
$8 \text{ ft} \times 2 \rightarrow 512$

$A = 256 + 512$

$A = 768$ sq. ft

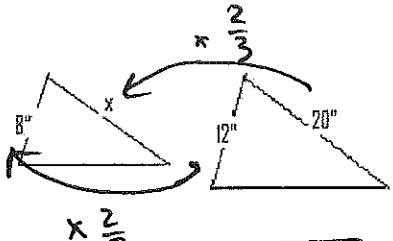
7. Are the two triangular trusses similar? Why or Why not?

Yes they are because they have the same angles.



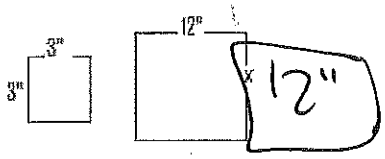
8. Find the missing values. Assume the figures are similar.

a)



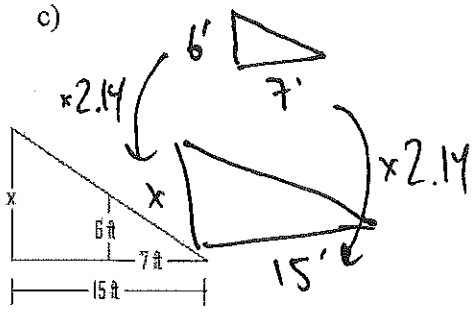
x = 13.3"

b)



12"

c)

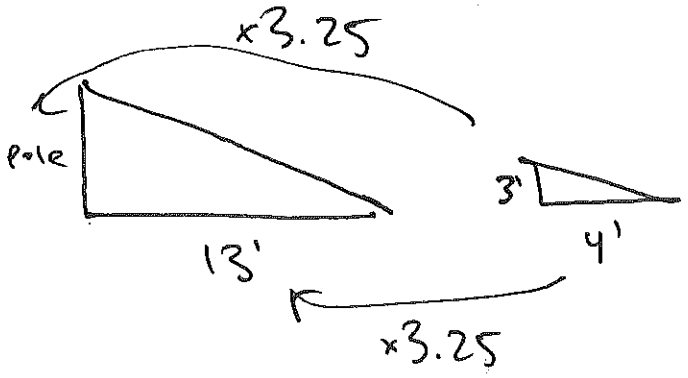


12.86 ft

9. Convert 8' 4" into feet so that you can enter it into your calculator.

8.333

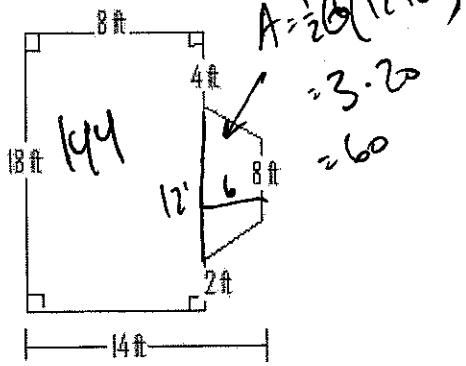
10. The sun casts a 13 ft shadow of a pole. The fire hydrant which is 3 ft tall casts a 4 ft shadow. How tall is the pole?



9.75 ft

11. Find the area of the decks shown below.

a)



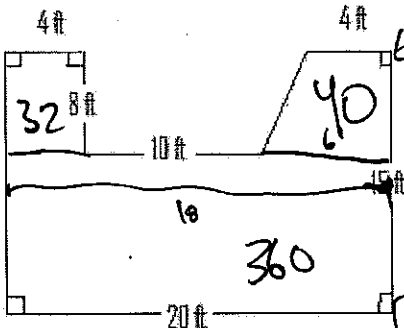
$A = \frac{1}{2}6(12+8)$

$= 3 \cdot 20$

$= 60$

144 + 60 = 204 sq. ft

b)



$A = \frac{1}{2}8(6+4)$

$= 4 \cdot 10$

$= 40$

360 + 40 + 32 = 432 sq. ft

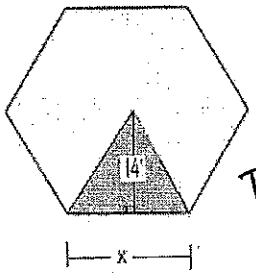
12. Find the missing value.

a) The home owner has requested a round gazebo with an area of 78.5 sq ft (25π). What is the radius?

$r^2 = 25$

$r = 5$ ft

b) The hexagon home shown below needs to have the room (shaded area) to be 100 sq ft. What would the length of the side need to be?

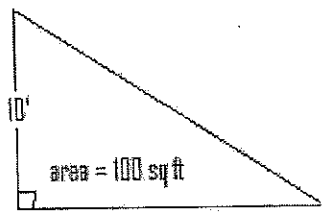


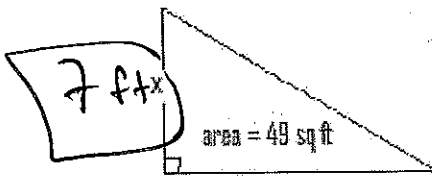
Triangle, so $\frac{b \cdot h}{2} = 100$

$b \cdot 14 = 200$

$x = 14.29$ ft

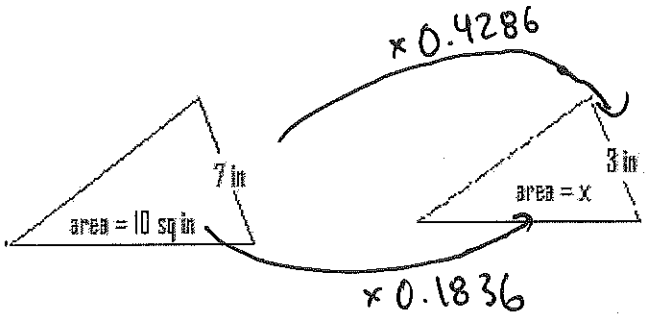
c) The similar triangles are shown. Find the value of x.





13. Find the missing values. Assume the figures are similar.

a)

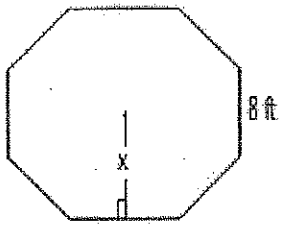


(side ratio)^2 = area ratio

$(0.4286)^2$ = area ratio

Area = 1.84 sq. in

b) Area = 96 sq ft of the regular octagon



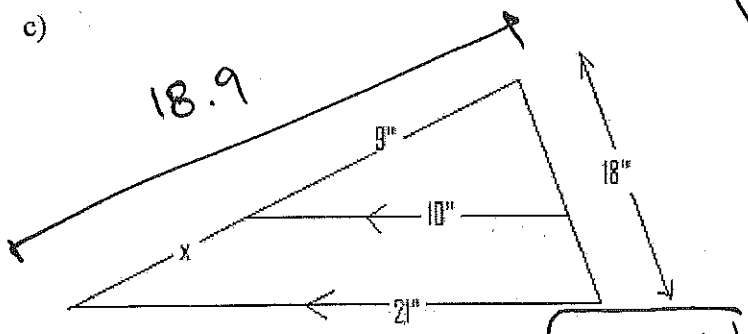
P = 64 ft

$\frac{64 \cdot x}{2} = 96$

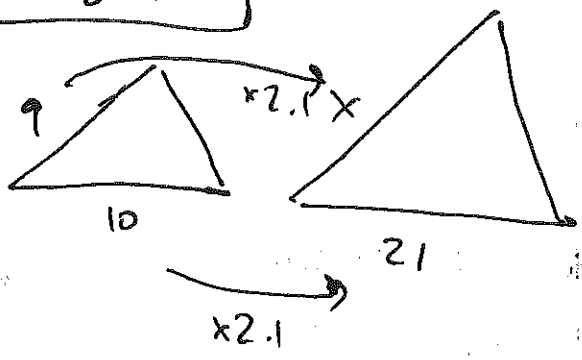
$64 \cdot x = 192$

x = 3 ft

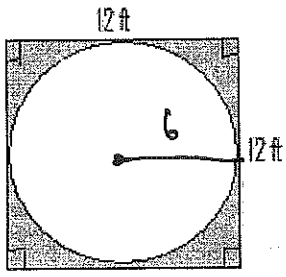
c)



x = 9.9"



14. Find the area of the shaded region.



$A_{\square} = 144$ sq. ft

$A_o = \pi(6)^2 = 113.10$

> 30.9 sq. ft

15. Solve

a) $\frac{x}{3} = \frac{7}{9}$

b) $\frac{x+1}{6} = \frac{5}{11}$

16. Looking at a blueprint, you measure 2 sides of a rectangular room.
One side is $7\frac{1}{4}$ inches and the other side is $6\frac{3}{8}$ inches. The scale is $\frac{1}{8}\,inch = 1\,foot$

58'

a) What is the real life lengths of the walls (sides)?

58' × 51'

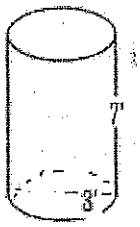
b) What is the real life area of the room?

2958 sq. ft

17. Find the surface area (include all surfaces).

$7^2+3^2=c^2$

a) b) c) d) e)



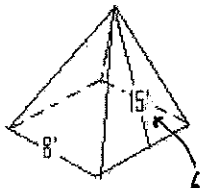
$SA = 2\pi rh + 2\pi r^2$

$= 6\pi \cdot 7 + 2\pi \cdot 9$

$= 42\pi + 18\pi$

$= 60\pi$

SA = 188.5 sq. ft



60
× 4
240
+ 64

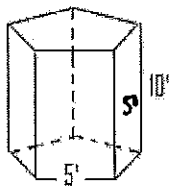
304 sq. ft

7.62

$\pi rl + \pi r^2$

$\pi \cdot 3(7.62) + \pi(3)^2$

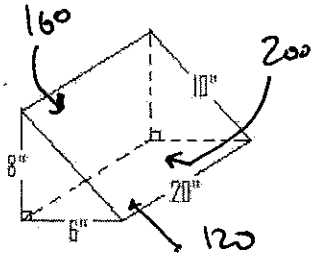
100.09 sq. ft



$SA = 50.5 + \frac{a \cdot P}{2}$

$250. + \frac{1}{2}\left(\frac{4.25}{2}\right)$

350 sq. ft



$A = \frac{b \cdot h}{2} = \frac{6 \cdot 8}{2} = 24 \cdot 2$

$= 48$

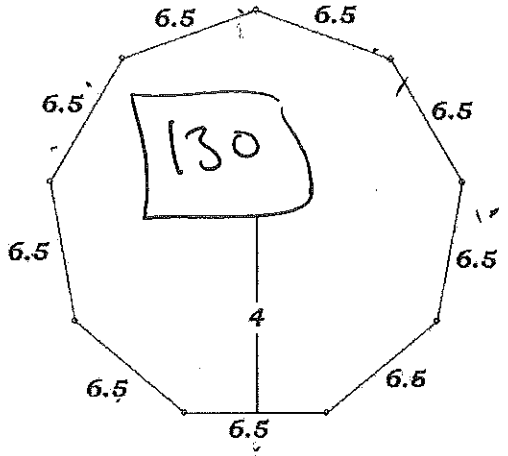
$A = 160 + 200 + 120 + 48$

= 528 sq. in

REVIEW for Geometry in Construction Test 2

Find the (combined) area of each of the regular polygonal shapes below.

1.



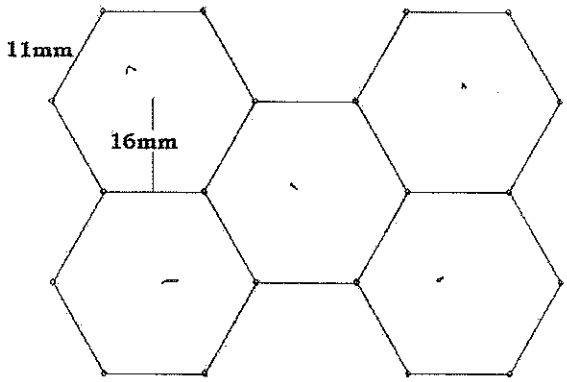
P = 65

$A = \frac{a \cdot P}{2}$

$= \frac{4 \cdot 65}{2}$

130

2.



P = 66

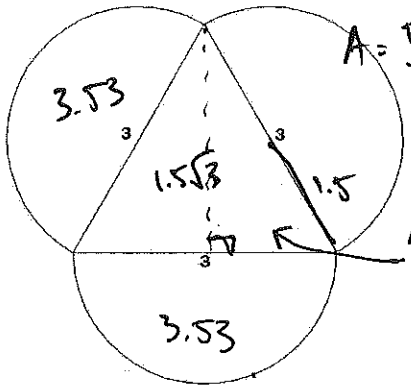
$A = \frac{16 \cdot 66}{2}$

A = 528

× 5

2640

3.



$A = \frac{\pi (1.5)^2}{2} = 3.53 \times 3 = 10.6$

A = 3.9

10.6 + 3.9 =

14.5

Find the surface area of the following shapes.

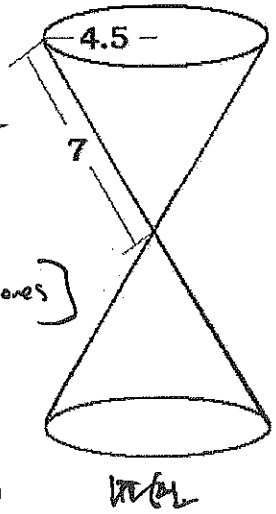
4. The cones are identical

$\pi r^2 + \pi r \cdot l$

$\pi (4.5)^2 + \pi (4.5) \cdot 7$

162.57

× 2 [two cones]

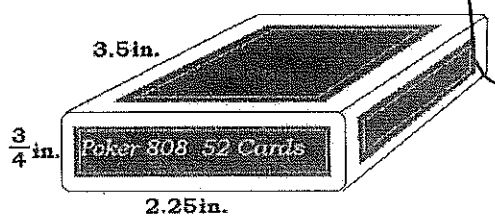


SA = 325.15

5.

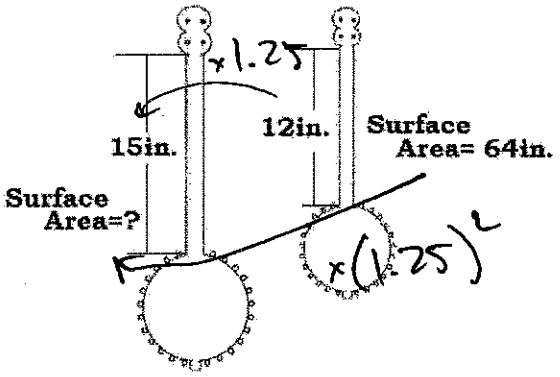
$2\left[3.5(2.25) + 0.75(2.25) + 0.75(3.5)\right]$

15.75 + 3.375 + 8.5



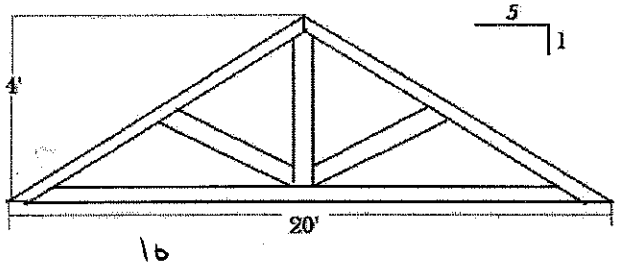
27.625 sq. in

1. The following banjos are similar in shape. Find the surface area of the larger banjo.



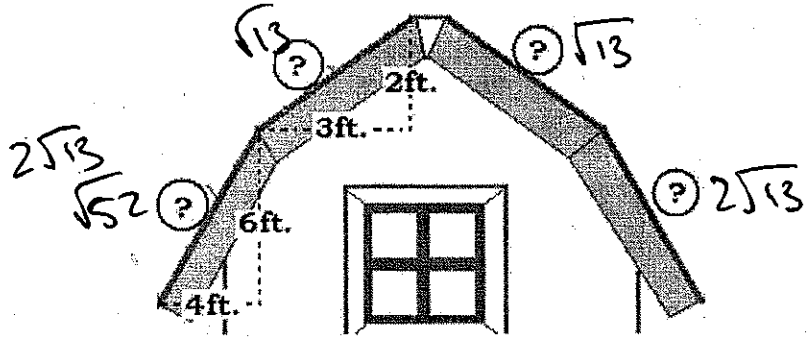
100 sq. in

2. Do the measurements for this truss match the given pitch needed?



No, the truss has a $\frac{2}{5}$ pitch, not a $\frac{1}{5}$.

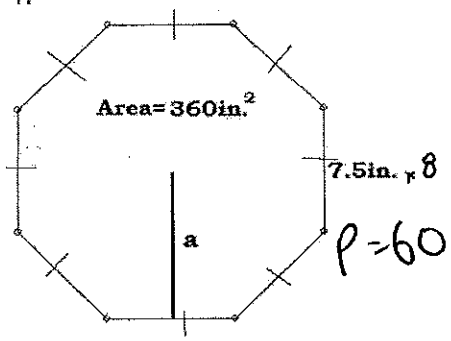
3. What is the combined length of all four boards on this barn? Exact answers. Right and left halves are symmetrical



$6\sqrt{13}$ ft

Find the unknown values of the following figures.

4.

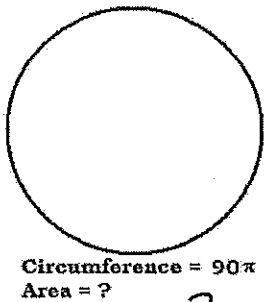


P=60

$\frac{2 \cdot 60}{2} = 360$

a=12 in

5.



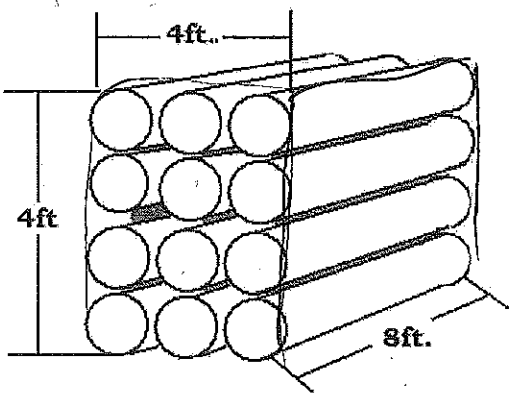
2R=90

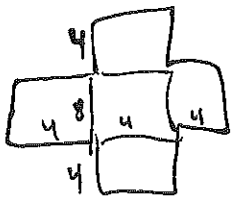
R=45

$A=\pi(45)^2$

A=6361.73

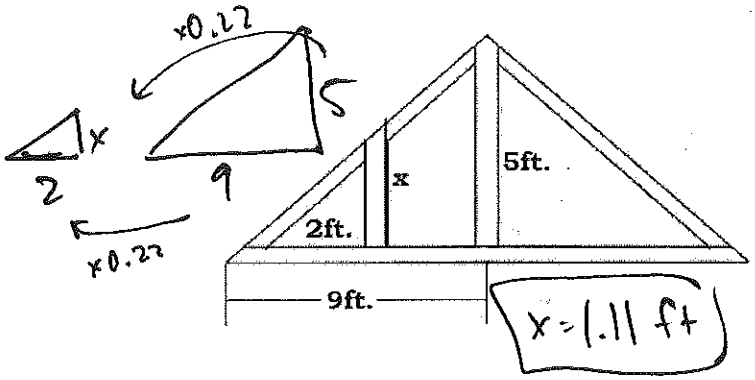
1. This stack of logs need to be covered with a plastic sheet. What are the dimensions of the plastic sheet that will cover this stack?





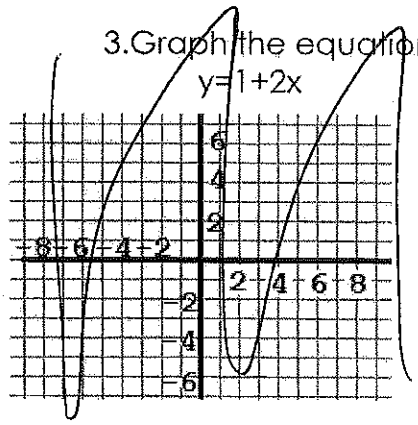
12' by 16'

2. Find the unknown length

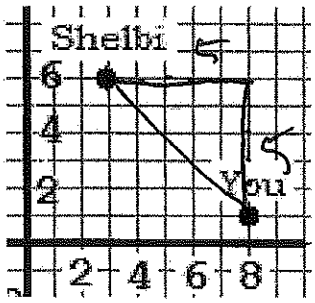


x = 1.11 ft

3. Graph the equation



4. You and your friend Shelbi are lost. You use your navigation device to get each other's coordinates, then draw a map of where you are. What is the distance between you two?

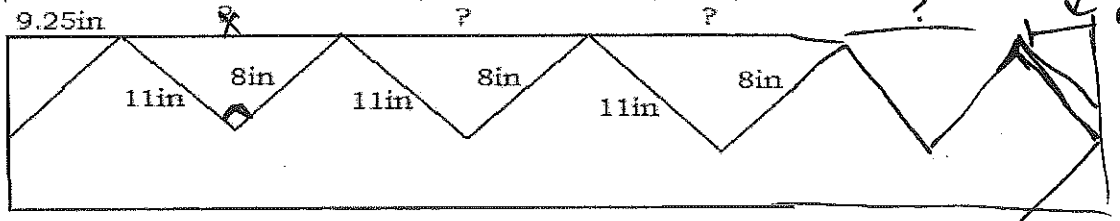


$5\sqrt{2}$

5. The following is the beginning of a blueprint for a stringer. Suppose you needed to have **five steps**, how long should you cut your stringer? *(Be careful about how many "?" there really are.)*

13.6 - 9.25

4.25



$8^2 + 11^2 = x^2$

$64 + 121 = x^2$

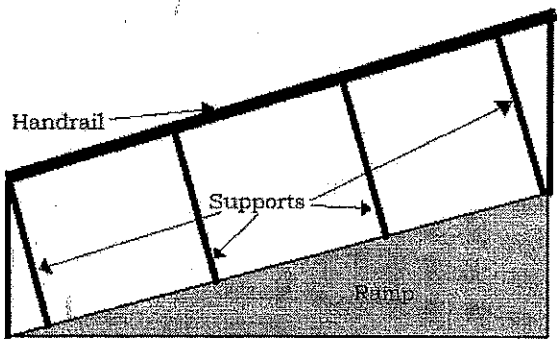
$x = 13.6$

67.9 in

1. The following ramp has a slope gradient of 12%.
What is the slope of the handrail, represented as a fraction?

$\frac{12}{100}$

2. The supports on this same ramp are perpendicular to the handrail and the ramp. **What is the slope of each of the supports?**

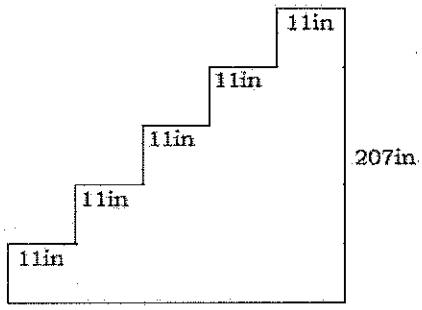


$\frac{100}{12}$

NOT COVERED

3. State code requires that steps in households cannot have a slope larger than ¾. Given that the steps are **11in wide** and the height needed to go is **207in.**, how many whole steps are required to keep the slope of the stairs up to code?

$3\overline{)4}$



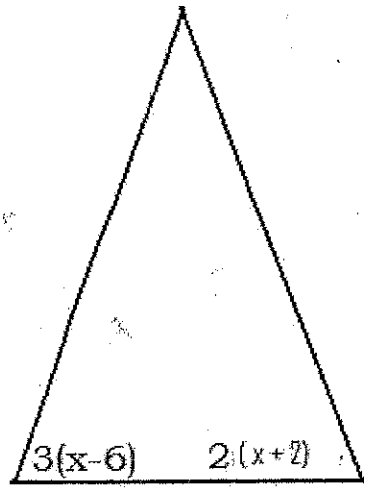
$8.25\overline{)11}$

$\frac{207}{8.25}$ 25.09 =

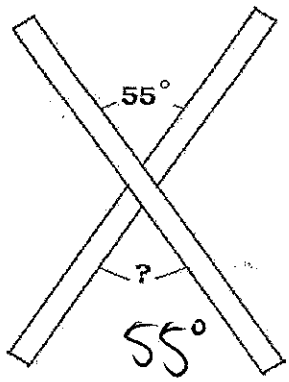
26 steps

Find the Unknown ANGLES

4. An Isosceles

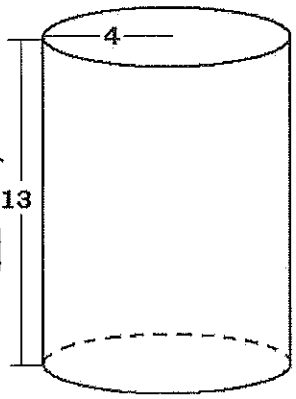


5. Two boards crossed



Find the Volume of these 3D objects

1.

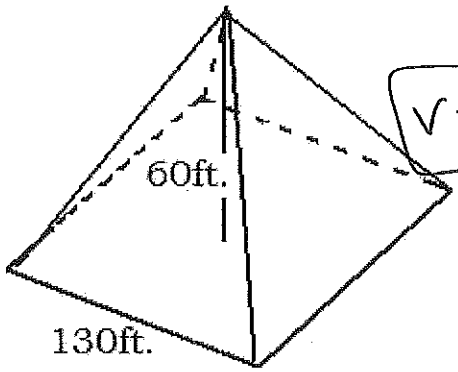


$V = \pi r^2 \cdot h$

$= \pi(4)^2 \cdot 13$

$V = 653.45$

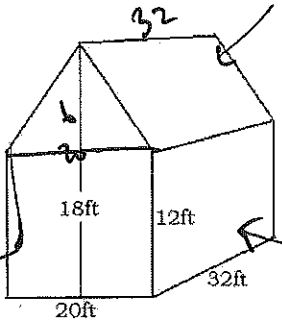
2.



$V = \frac{BA \cdot h}{3} = \frac{130 \cdot 130 \cdot 60}{3}$

$V = 338{,}000$ cu. ft

3.



$V = \frac{b \cdot h}{2} \cdot (32)$

$= 60 \cdot 32$

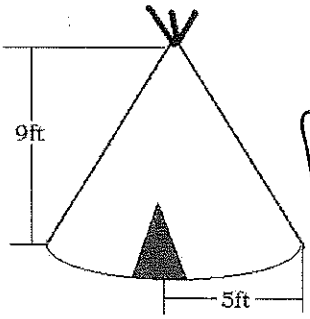
$= 1920$

9600 cu. ft

$V = 20 \cdot 32 \cdot 12$

$= 7680$

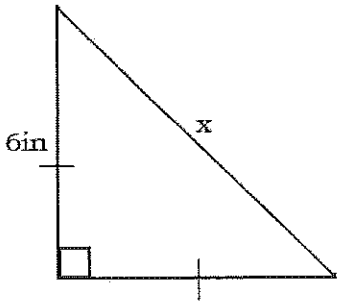
4.



$V = \frac{\pi r^2 \cdot h}{3} = \frac{\pi (5)^2 \cdot 9}{3}$

$V = 253.62$ cu. ft

5. Find the exact value of x



$6\sqrt{2}$

Geometry in Construction Name_____ Period_____
Trig review

#1-4 Find the missing values

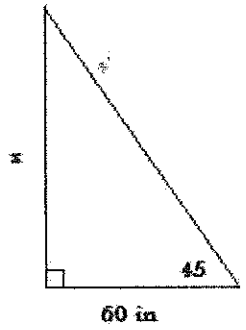
1. 60 in

2. 41.77

3. 53.13°

4. 116.68

1.

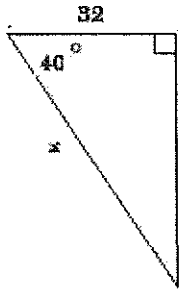


$\tan 45 = \frac{x}{60}$

$x = 60 \cdot \tan 45$

$x = 60$

2.

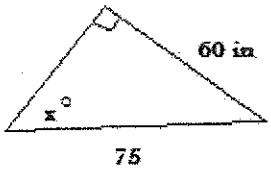


$\cos 40 = \frac{32}{x}$

$\frac{1}{\cos 40} = \frac{x}{32}$

$x = \frac{32}{\cos 40}$

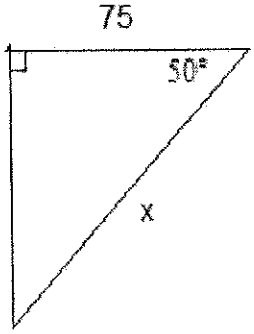
3.



$\sin x = \frac{60}{75}$

$x = \sin^{-1}\left(\frac{60}{75}\right)$

4.



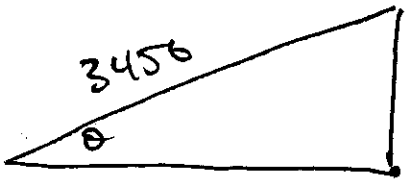
$\cos 50 = \frac{75}{x}$

$\frac{1}{\cos 50} = \frac{x}{75}$

$x = \frac{75}{\cos 50}$

5. 4.80°

5. Find the angle of elevation of a highway that is 3456 ft long (hypotenuse) and rises 289 ft.

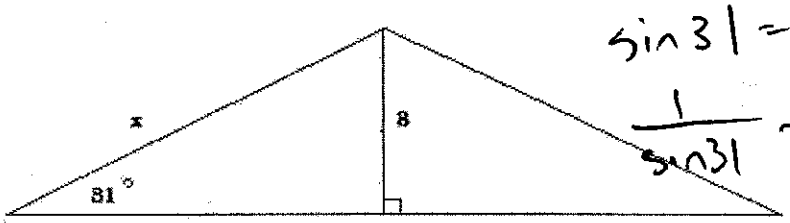


$\sin\theta = \frac{289}{3456}$

$\theta = \sin^{-1}\left(\frac{289}{3456}\right)$

6. 15.53

6. Find the length of the rafter (x) given the roof design shown below.



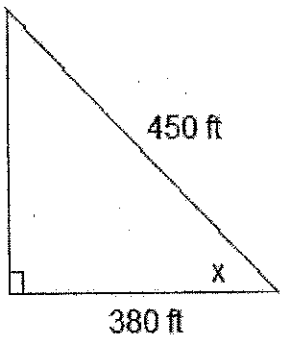
$\sin 31 = \frac{8}{x}$

$\frac{1}{\sin 31} = \frac{x}{8}$

$x = \frac{8}{\sin 31}$

7. 32.39°

7. The plot of land shown below has the measurements given. What is the measure of angle x.



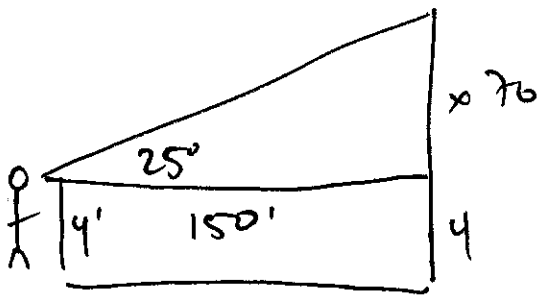
$\cos x = \frac{380}{450}$

$x = \cos^{-1}\left(\frac{380}{400}\right)$

8. 74 ft

8. Find the height of a tree if the angle of elevation is 25° through a piece of surveying equipment and you are standing 150 feet from the base of the tree. The height of the survey equipment is 4 feet.

$\tan 25 = \frac{x}{150}$



$x = 150 \cdot \tan 25$

$x = 70$

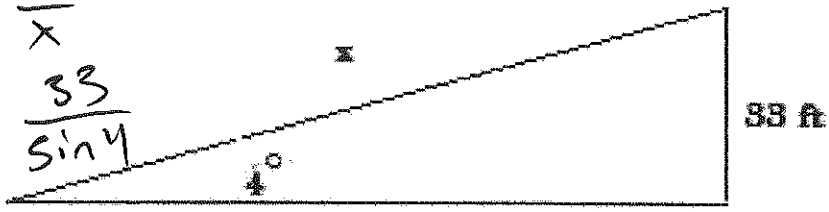
$+ 4$

9. 473 ft

9. An on ramp to Interstate 25 has an angle of elevation of 4°. The ramp needs to gain 33 feet in height. How long should the ramp be?

$\sin 4 = \frac{33}{x}$

$x = \frac{33}{\sin 4}$



10. _____

10. Solve and graph

$-2+3x \leq -8$

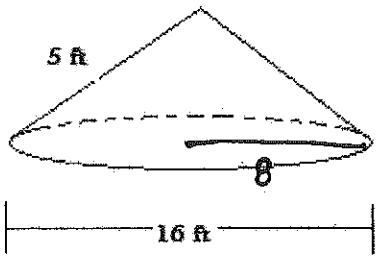
11. _____

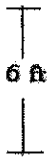
11. Solve and graph

$-13x - 64 > 1$

12. 326.73 sq. ft

12. Find the surface area of the feed storage building shown below.





$\pi r^2 + \pi r l$

$\pi(8)^2 + \pi \cdot 8 \cdot 5$

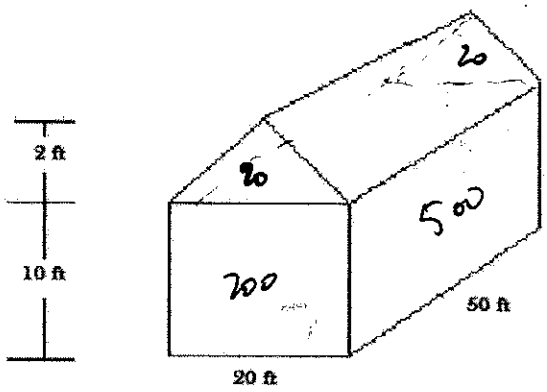
13. _____

13. Solve the equation:

$19 - 6(2x-3) = 10x - 7$

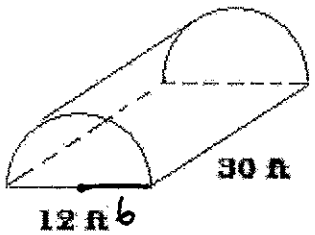
14. 1440 sq. ft

14. Find the surface area of the house shown. Do not include the floor or the shingles.



15. 1696.46 cu. ft

15. Find the volume of the Quonset hut.

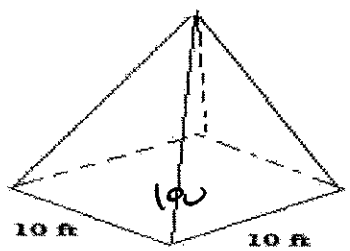


$$V = \frac{\pi r^2 \cdot h}{2}$$

$$V = \frac{\pi \cdot (6)^2 \cdot 30}{2}$$

16. 400 cu. ft

16. Find the volume of this home

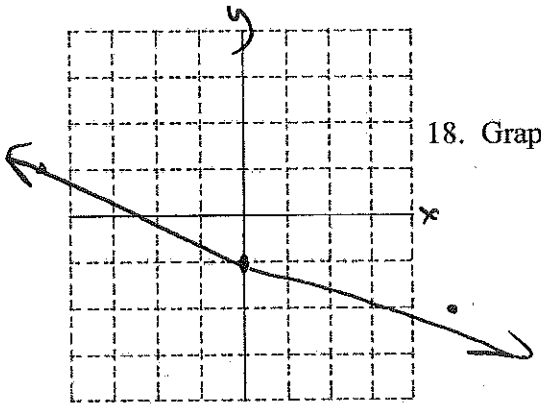


$$V = \frac{B_2 \cdot h}{3}$$

$$= \frac{100 \cdot 12}{3}$$

17. _____ 17a Find the slope of a line passing through (90,-6) and (42, -10)

_____ b. What is the slope of a line perpendicular to the line in 17a

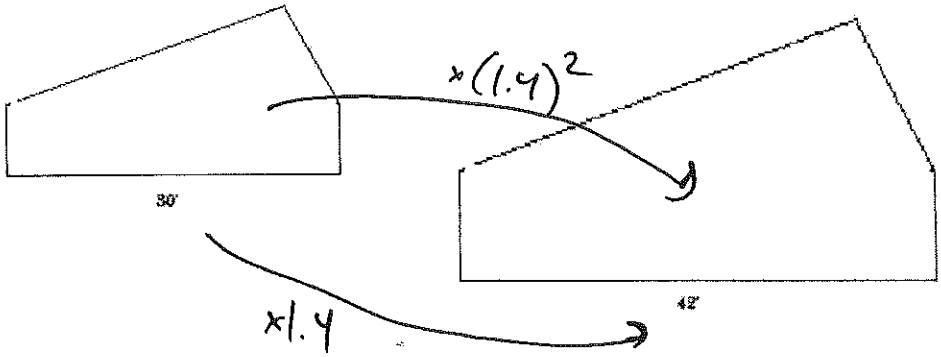


18. Graph $y = \frac{-1}{5}x - 1$

19. 294 gallons

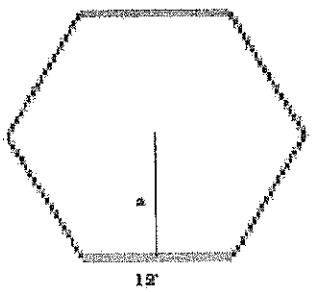
19. It takes 150 gallons of asphalt sealer to cover the original parking lot. How many gallons will it take for the new larger lot if it is a similar figure?

$150 \cdot (1.4)^2$



20. 16.39'

20. The regular hexagon deck shown has an area of 590 square feet. How long is the apothem?



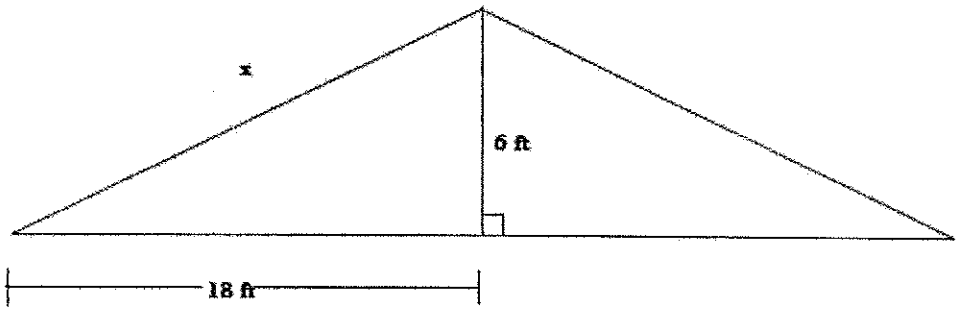
$P = 72'$

$\frac{2 \cdot 72}{2} = 590$

$6^2+18^2=x^2$

21. 18.97 ft

21. Find the length of the rafter shown.



22. _____

22. Simplify (no decimals) a) $\sqrt{45}$ $3\sqrt{5}$

b) $\sqrt{60} \bullet \sqrt{2}$

$2\sqrt{15}\cdot\sqrt{2}$ $2\sqrt{30}$

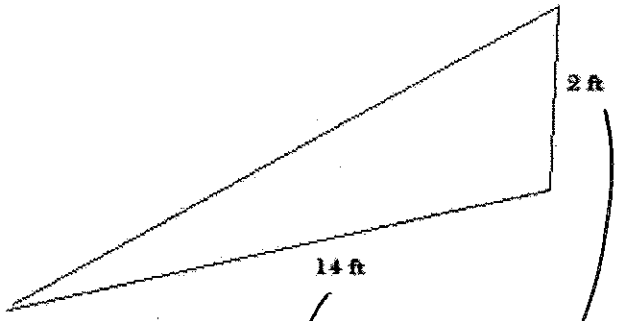
c) $\sqrt{60}+\sqrt{15}$

$2\sqrt{15}+\sqrt{15}$

$3\sqrt{15}$

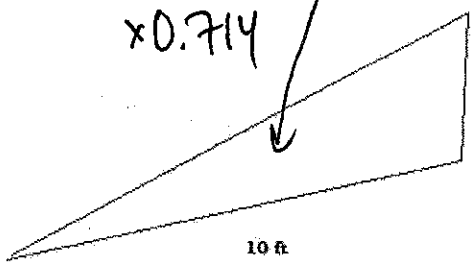
23. 1.43' _____

23. The trusses of the house we are building are similar. The big truss is shown below.



The small truss is similar and is shown below. Find the value of x.

$\times 0.714$



1.43