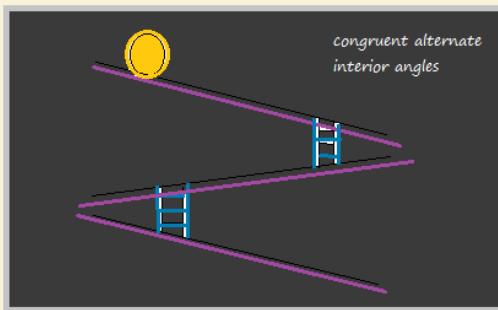


Geometry 06 Final Exam Review

Practice questions (and detailed solutions)

Topics include circles, parallel lines, special quadrilaterals, similarity, trigonometry, area, volume, and more.

"In this diagram, there is a circle that is tangent to a line segment... And, notice the parallel lines cut by a transversal!!"



"Isn't Mr. Mario the best teacher?!"



"I don't particularly care for him.."



"I like this geometry class.. But, why are we required to bring a calculator and a roll of quarters??"

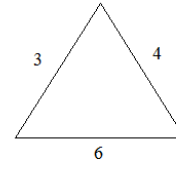
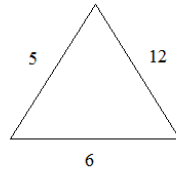
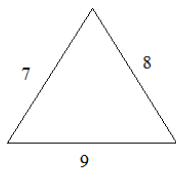
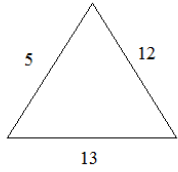


Donkey Kong

Ten questions and answers →

- 1) a) Two sides of a triangle measure 7 and 10.
What lengths could the third side be?

- b) Determine if the triangle is acute, obtuse, right, or does not exist:
(Triangles are not drawn to scale)



- c) In $\triangle ABC$,

$$\angle A = 46^\circ$$

$$\angle B = 61^\circ$$

$$\angle C = 73^\circ$$

Write the side lengths in order
of smallest to largest...

- In $\triangle DEF$,

$$\overline{DE} = 3$$

$$\overline{EF} = 4$$

$$\overline{FD} = 5$$

Write the angles
in order of smallest to largest...

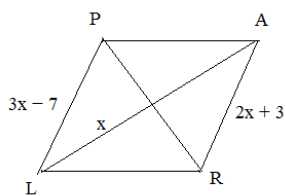
d) $m\angle S = 4x + 50$

$$m\angle T = 80 - 3x$$

$$m\angle V = x - 2$$

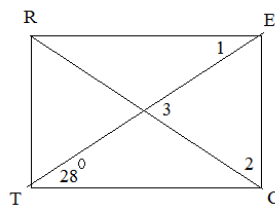
Find the measures of the 3 angles.

- 2) a)



In parallelogram P A R L,
what is the length of diagonal LA?

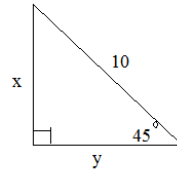
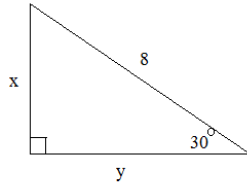
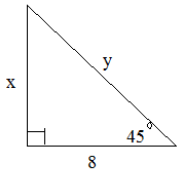
- b)



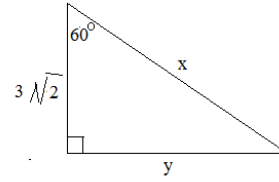
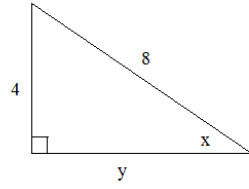
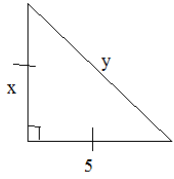
In rectangle R E C T,
what are the measures of angles 1, 2, and 3?

3) Find x and y

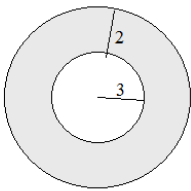
a)



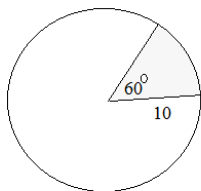
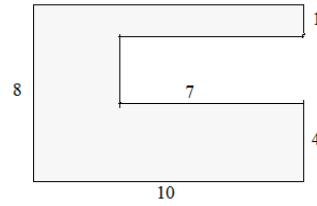
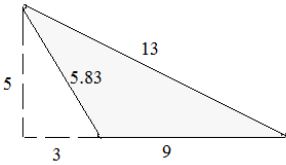
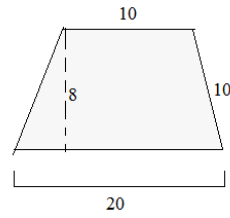
b)



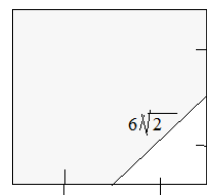
4) Find the shaded areas.



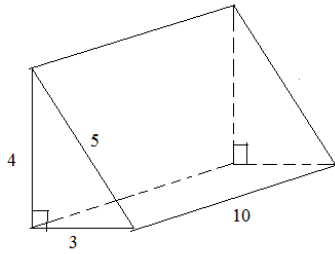
(trapezoid not drawn to scale)



(Square)

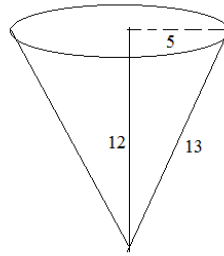


5) Find the volume and surface area of the following figures.



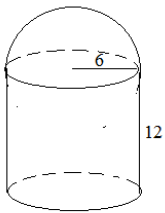
volume:

surface area:



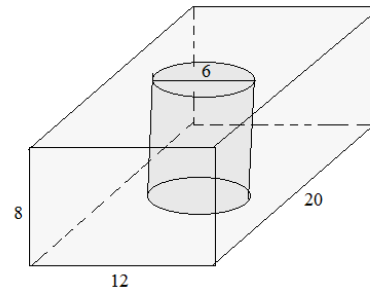
volume:

surface area:



volume:

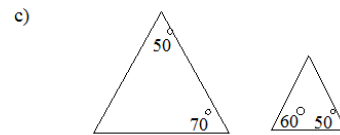
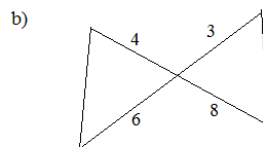
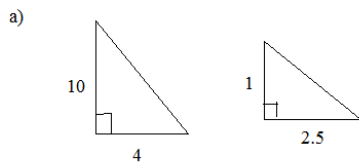
surface area:



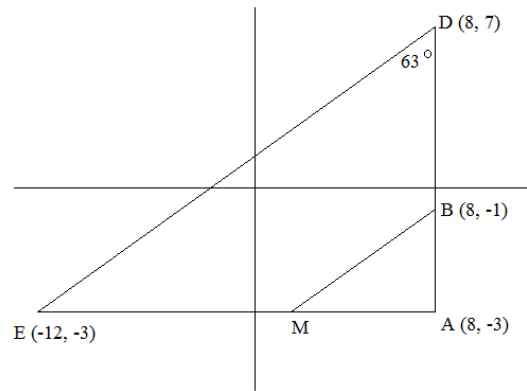
volume:

surface area:

6) Determine which pairs of triangles are similar. (Justify your answer.)



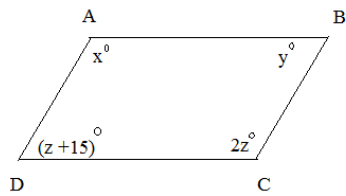
- 7) a) What is the scale factor from pre-image $\triangle MBA$ to image $\triangle EDA$?
 b) What is point M?
 c) What is the measure of angle E?



- 8) An isosceles triangle has a vertex angle of 36 degrees and a base length of 10 units.
 What is the perimeter and area of the triangle?

- 9) In the parallelogram, what is the value of y ?

- a) 55
 b) 65
 c) 70
 d) 75
 e) 110



- 10) A biker leaves home and rides 20 miles due north, turns and rides 25 miles east, turns right and heads 4 miles south, and finally turns and rides 5 miles east. How far from home is the biker?

- 1) a) Two sides of a triangle measure 7 and 10.
What lengths could the third side be?

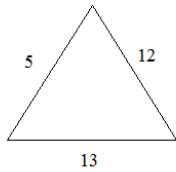
$$7 + 10 = 17 \quad \text{side must be less than 17 (or 7 and 10 can't reach)}$$

$$10 - 7 = 3 \quad \text{side must be greater than 3 (or the 10 is too big)}$$

$$3 < \text{side} < 17$$

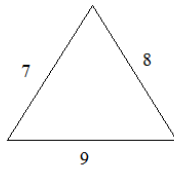
SOLUTIONS

- b) Determine if the triangle is acute, obtuse, right, or does not exist:
(Triangles are not drawn to scale)



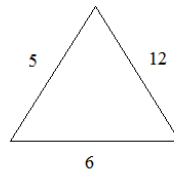
$$5^2 + 12^2 = 13^2$$

Pythagorean Theorem
Right Triangle



$$7^2 + 8^2 > 9^2$$

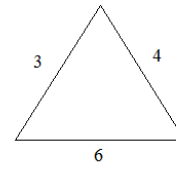
Acute Triangle



$$5 + 6 < 12$$

Two sides don't connect
Fails the triangle inequality theorem...

Does not exist



$$3^2 + 4^2 < 6^2$$

Obtuse Triangle

- c) In $\triangle ABC$,

$$\angle A = 46^\circ$$

$$\angle B = 61^\circ$$

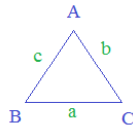
$$\angle C = 73^\circ$$

Write the side lengths in order of smallest to largest...

smallest side opposite smallest angle
largest side opposite largest angle

$$a < b < c$$

$$\text{or } \overline{BC} < \overline{AC} < \overline{AB}$$



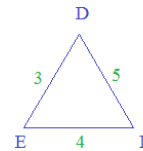
- In $\triangle DEF$,

$$\overline{DE} = 3$$

$$\overline{EF} = 4$$

$$\overline{FD} = 5$$

Write the angles in order of smallest to largest...



$$\angle F < \angle D < \angle E$$

- d) $m\angle S = 4x + 50$

$$m\angle T = 80 - 3x$$

$$m\angle V = x - 2$$

Find the measures of the 3 angles.

Sum of angles in Triangle = 180 degrees

$$(4x + 50) + (80 - 3x) + (x - 2) = 180$$

$$2x + 128 = 180$$

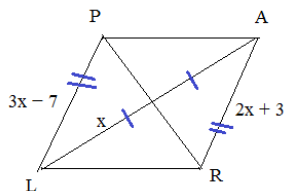
$$x = 26$$

$$\text{Angle S} = 154$$

$$\text{Angle T} = 2$$

$$\text{Angle V} = 24$$

- 2) a)



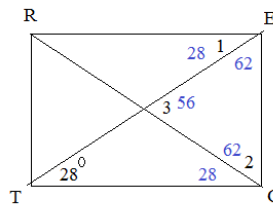
In parallelogram PRLA,
what is the length of diagonal LA?

$$3x - 7 = 2x + 3 \quad (\text{opposite sides are congruent})$$

$$x = 10$$

Since $x = 10$, the length of LA is $\boxed{20}$

- b)



In rectangle RECT,
what are the measures of angles 1, 2, and 3?

angle 1 = 28 degrees (alternate interior angles)

angle 2 = 62 degrees (complementary angles)

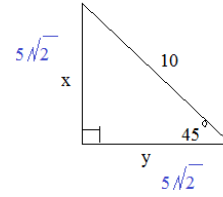
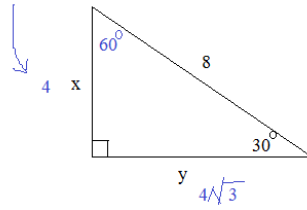
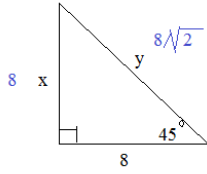
angel 3 = 56 degrees

3) Find x and y

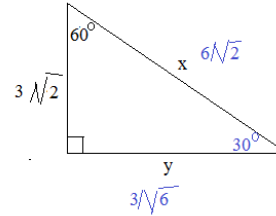
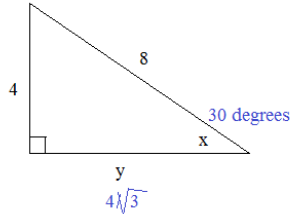
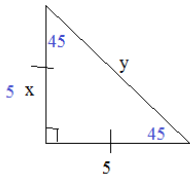
small side is 1/2 the hypotenuse

SOLUTIONS

a)

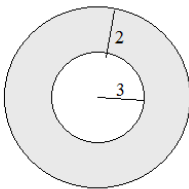


b)



congruent sides,
so isosceles 45-45-90 right triangle

4) Find the shaded areas.

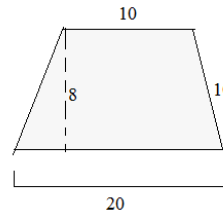


area of entire circle: 25π

area of cut out
white circle: 9π

shaded area: 16π

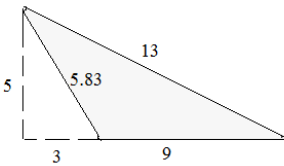
(trapezoid not drawn to scale)



area of trapezoid:

$$\frac{1}{2}(\text{base1} + \text{base2})(\text{height})$$

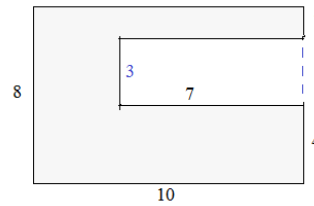
$$\frac{1}{2}(30)(8) = 120 \text{ sq. units}$$



area of triangle = $\frac{1}{2}(\text{base})(\text{height})$

$$= \frac{1}{2}(9)(5)$$

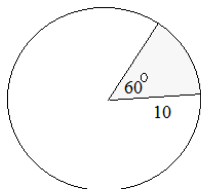
$$= 22.5 \text{ sq units}$$



Area of enclosed rectangle
 $8 \times 10 = 80$

Area of cut out white rectangle
 $7 \times 3 = 21$

59 sq. units

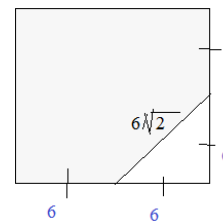


sector area = $\frac{\text{angle}}{360} \pi (\text{radius})^2$

$$= \frac{60}{360} (100\pi)$$

$$= \frac{50}{3} \pi$$

(Square)

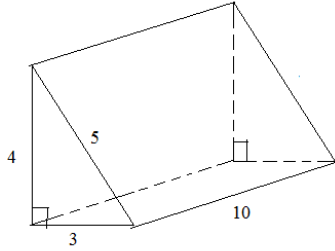


Area of square = $12 \times 12 = 144$

Area of white triangle = 18

Shaded area = 126 sq units

5) Find the volume and surface area of the following figures.



this is a triangular prism...

$$\text{volume} = (\text{area of base})(\text{height})$$

$$\frac{1}{2}(3)(4)(10) = 60$$

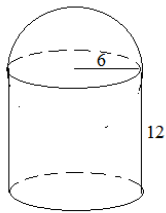
triangle height

For the surface area, we'll add the five sides...

base triangles: $6 \times 2 = 12$	}	total: 132
right: $5 \times 10 = 50$		
left: $4 \times 10 = 40$		
bottom: $3 \times 10 = 30$		

volume: 60 cubic units

surface area: 132 square units



this is a cylinder with a hemisphere on top of it...

$$\text{volume of a cylinder: } (\text{area of base})(\text{height})$$

$$(36\pi)(12) = 432\pi$$

$$\text{volume of hemisphere: } \frac{1}{2} \cdot \frac{4}{3}\pi(\text{radius})^3$$

$$\frac{2}{3}(216\pi) = 144\pi$$

volume: 576π cubic units

surface area: 252π square units

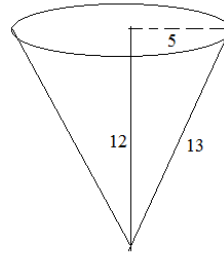
To find the surface area, we'll go piece by piece...

$$\text{bottom: (area of a circle)} = 36\pi$$

$$\begin{aligned} \text{middle: (lateral area of a cylinder)} &= (\text{circumference})(\text{height}) \\ &= (12\pi)(12) = 144\pi \end{aligned}$$

$$\text{top: (hemisphere)} = \frac{1}{2} \cdot 4\pi(\text{radius})^2 = 72\pi$$

SOLUTIONS



this is a cone (with one base)...

$$\text{volume} = \frac{1}{3}(\text{area of base})(\text{height})$$

$$\frac{1}{3}(25\pi)(12) = 100\pi$$

$$\text{lateral area of cone: } \frac{1}{2}(\text{circumference})(\text{slant height})$$

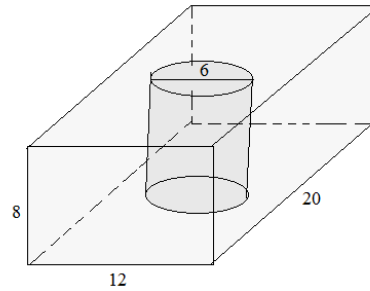
$$\frac{1}{2}(10\pi)(13) = 65\pi$$

$$\text{area of base: } 25\pi$$

$$\text{total surface area: } 90\pi$$

volume: 100π cubic units

surface area: 90π square units



this is a rectangular prism with a cylinder cut out of it

$$\begin{aligned} \text{volume of prism:} \\ (8)(12)(20) &= 1920 \end{aligned}$$

$$\begin{aligned} \text{volume of cylinder:} \\ (9\pi)(8) &= 72\pi \end{aligned}$$

surface area:

top and bottom:

$$\begin{aligned} 2 \times [(240) - 9\pi] &= \\ 480 - 18\pi \end{aligned}$$

$$\begin{aligned} \text{lateral area: (perimeter)(height)} \\ (64)(8) &= 512 \end{aligned}$$

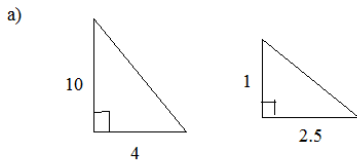
inside surface of cut out cylinder:

$$\begin{aligned} (\text{circumference})(\text{height}) \\ (6\pi)(8) &= 48\pi \end{aligned}$$

volume: 1694 cubic units (approx)

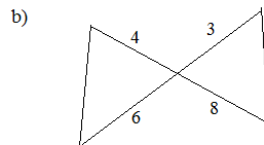
surface area: $992 + 30\pi$

6) Determine which pairs of triangles are similar. (Justify your answer.)



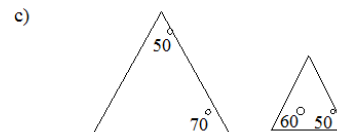
Similar -- (Side-Angle-Side)

sides are proportional and included angle congruent



NOT similar

vertical angles congruent, but corresponding sides not proportional



Similar -- (Angle-Angle)

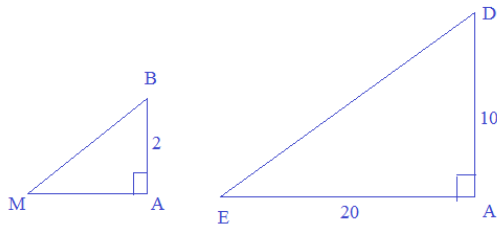
Corresponding angles are congruent 50-60-70 triangles

7) a) What is the scale factor from pre-image $\triangle MBA$ to image $\triangle EDA$?

b) What is point M?

c) What is the measure of angle E?

Isolating the triangles, and finding their lengths, we have

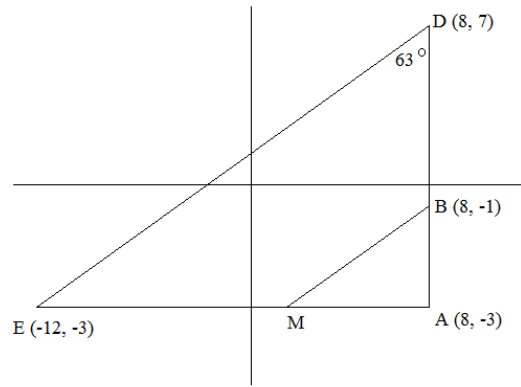


ratio of BA:DA is 2:10... so, scale factor is 5

$$\frac{MA}{EA} = \frac{2}{10} \quad \frac{MA}{20} = \frac{2}{10} \quad MA = 4 \quad \text{So, point M is } (4, -3)$$

Since angle D = 63 degrees, angle E (and, $\angle BMA$) is 27 degrees

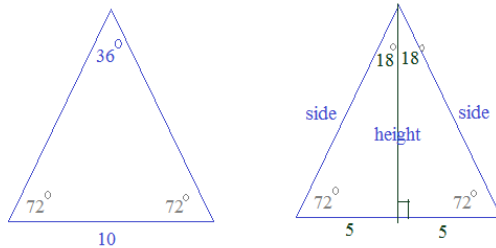
SOLUTIONS



8) An isosceles triangle has a vertex angle of 36 degrees and a base length of 10 units. What is the perimeter and area of the triangle?

$$180 - 36 = 144$$

so, base angles are 72...



$$\tan(72^\circ) = \frac{\text{height}}{5}$$

$$\text{height} = 15.4$$

$$\cos(72^\circ) = \frac{5}{\text{side}}$$

$$\text{side} = 16.2$$

$$\text{Area} = \frac{1}{2} (\text{base})(\text{height})$$

$$= \frac{1}{2} (10)(15.4)$$

$$76.9 \text{ sq. units}$$

$$\text{Perimeter} = 42.4 \text{ units}$$

9) In the parallelogram, what is the value of y?

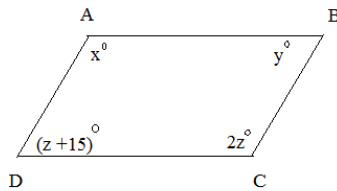
a) 55

b) 65

c) 70

d) 75

e) 110



Since consecutive angles are supplementary...

$$(z + 15) + 2z = 180$$

$$3z + 15 = 180$$

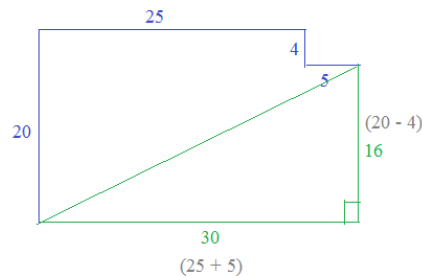
$$3z = 165 \quad z = 55$$

Angle D = 70 degrees

Since opposite angles are congruent,

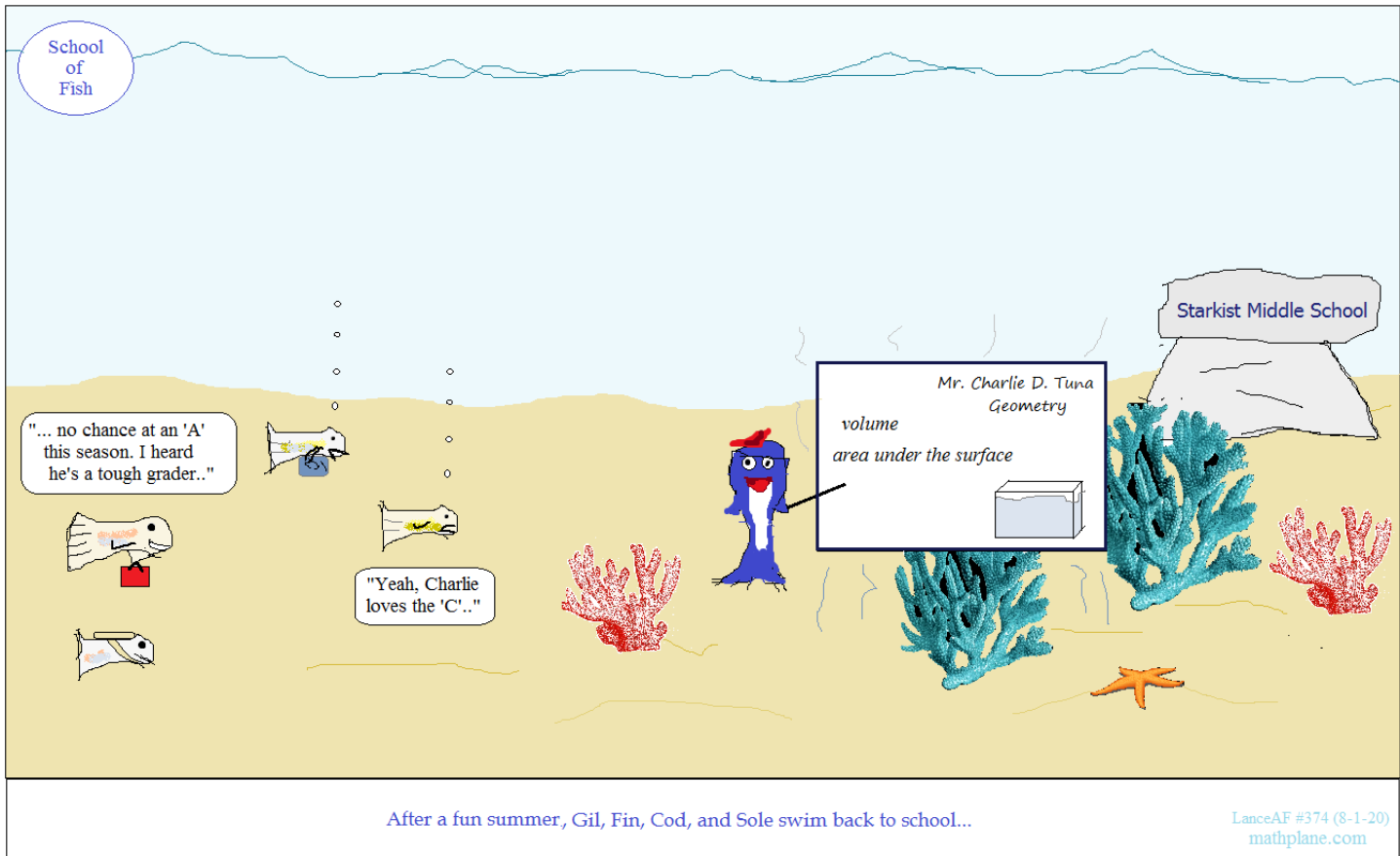
$$y = 70 \text{ degrees}$$

10) A biker leaves home and rides 20 miles due north, turns and rides 25 miles east, turns right and heads 4 miles south, and finally turns and rides 5 miles east. How far from home is the biker?



$$16 - 30 - ?$$

the distance is 34..

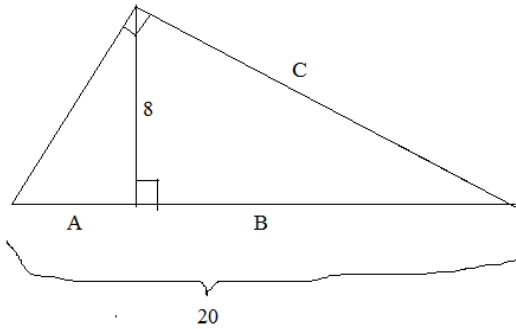


More math questions-→

Geometry Final Exam Review Questions

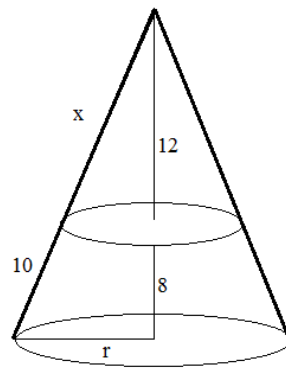
Similarity and Proportions

1) Find A, B, and C

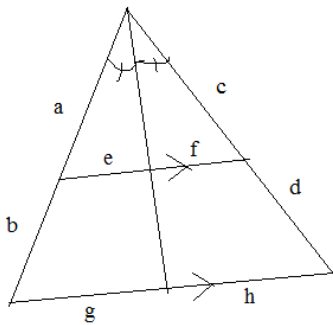


2) The radius (r) of the lower circle is

- a) 6
- b) 9
- c) 10
- d) 12
- e) 15



3) Match the proportion with the theorem or justification



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

2) $\frac{e}{f} = \frac{a}{c}$

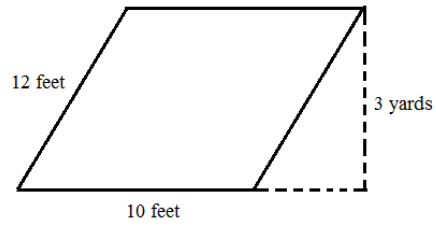
3) $\frac{a}{e} = \frac{b}{g}$

4) $\frac{a}{a+b} = \frac{c}{c+d}$

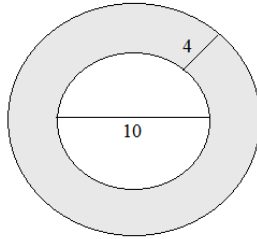
- A) Angle Bisector
- B) Side-Splitter
- C) Triangles ---> corresponding sides are proportional
- D) Equation is not always true

Perimeter and Area

- 1) Find the area of the parallelogram



- 2) Find the shaded area:



- a) 6π
- b) 9π
- c) 12π
- d) 56π
- e) 84π

- 3) Find the perimeter of a rhombus with diagonals 14 and 48.

- 4) The ratio of the sides of a trapezoid are $2 : 5 : 8 : 5$

If the area is 245, what is the base, height, and perimeter of the trapezoid?

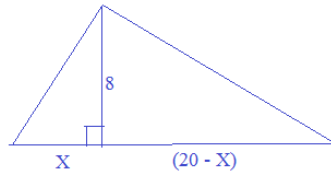
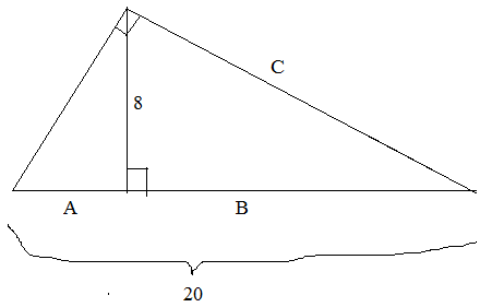
- 5) Find the perimeter of an equilateral triangle with altitude 12

Geometry Final Exam Review Questions

SOLUTIONS

Similarity and Proportions

1) Find A, B, and C



$$8^2 = (X)(20 - X)$$

properties of altitude to hypotenuse of right triangle...

$$64 = 20X - X^2$$

$$X^2 - 20X + 64 = 0$$

$$(X - 16)(X - 4) = 0$$

$$X = 16 \text{ or } 4$$

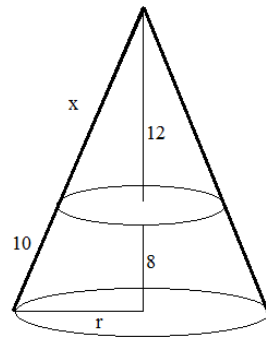
$$A = 4 \quad B = 16$$

Then, $C = 8\sqrt{5}$

Pythagorean Theorem

2) The radius (r) of the lower circle is

- a) 6
- b) 9
- c) 10
- d) 12
- e) 15

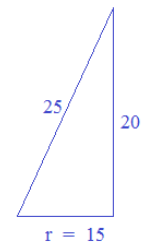


recognizing similar triangles...

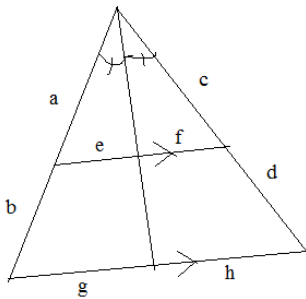
$$\frac{x}{(x + 10)} = \frac{12}{20}$$

$$20x = 12x + 120$$

$$x = 15$$



3) Match the proportion with the theorem or justification



1) $\frac{b}{a} = \frac{d}{c}$ B - side-splitter

2) $\frac{e}{f} = \frac{a}{c}$ A = angle bisector

3) $\frac{a}{e} = \frac{b}{g}$ D - not always true

4) $\frac{a}{a+b} = \frac{c}{c+d}$ C - corresponding sides proportional

A) Angle Bisector

B) Side-Splitter

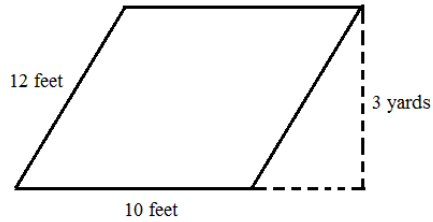
C) Triangles ---> corresponding sides are proportional

D) Equation is not always true

Perimeter and Area

SOLUTIONS

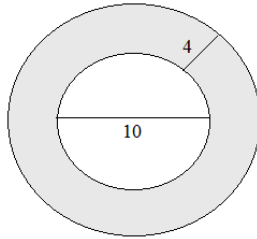
- 1) Find the area of the parallelogram



Area of a parallelogram = base x height

$$10 \text{ feet} \times 9 \text{ feet} = 90 \text{ square feet}$$

- 2) Find the shaded area:



- a) 6π
- b) 9π
- c) 12π
- d) 56π
- e) 84π

big circle radius: $5 + 4 = 9$

area of big circle: 81π

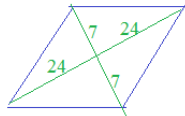
small circle radius: 5

area of small circle: 25π

$$56\pi$$

- 3) Find the perimeter of a rhombus with diagonals 14 and 48.

The diagonals of a rhombus are perpendicular bisectors...



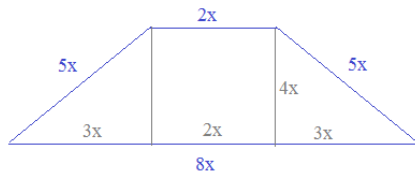
Pythagorean Triple: 7-24-25

so, each side is 25 units

$$\text{perimeter is } 4 \times 25 = 100 \text{ units}$$

- 4) The ratio of the sides of a trapezoid are 2 : 5 : 8 : 5

If the area is 245, what is the base, height, and perimeter of the trapezoid?



3 - 4 - 5 triangles... $3x$ $4x$ $5x$

$$\frac{1}{2} (\text{base1} + \text{base2})(\text{height}) = 245$$

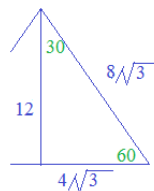
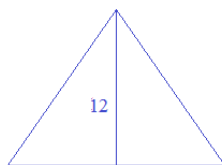
$$\frac{1}{2} (10x)(4x) = 245$$

$$20x^2 = 245$$

$$x = 3.5$$

base: 28
height: 14
perimeter: 70

- 5) Find the perimeter of an equilateral triangle with altitude 12

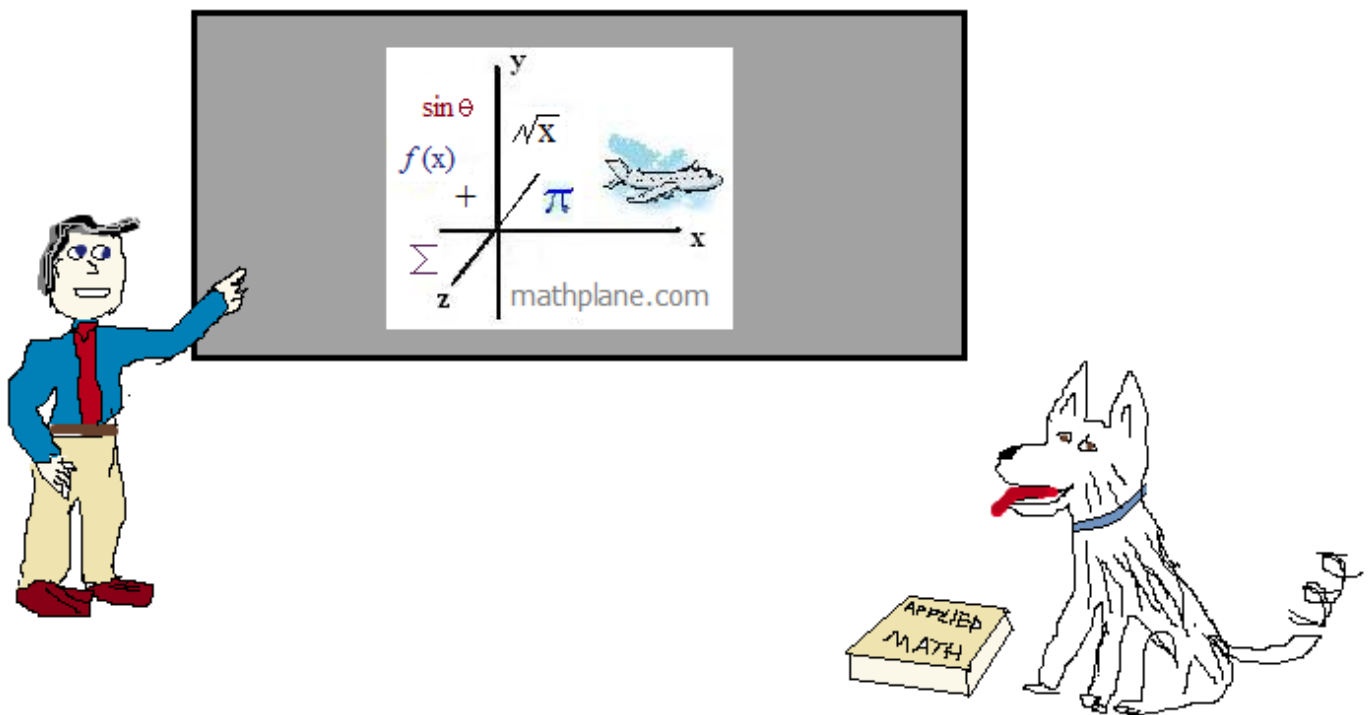


$$\text{perimeter} = 24\sqrt{3}$$

Thanks for visiting. (Hope it helped!)

If you have questions, suggestions, or requests, let us know.

Cheers



Also, at Mathplane.ORG for mobile and tablets.

And, at the mathplane store on TeachersPayTeachers