

Mr. Nolfi

Victim:

Mr. Solutions

Super work
Mr. S.!!

KU	APP	TIPS	COM
15/15	22/22	12/12	10/10

Modified True or False (5 KU)

Indicate whether each statement is **true** or **false**. If false, **change** the underlined part to make the statement true.

- F Math is like a dating service because it's all about realtors. Change: relationships ✓
- F If a cylinder has a volume of 150 cm^3 , then the volume of a cone with the same radius and height is 450 cm^3 . Change: 50 ✓
- F A square pyramid has five **lateral** faces. Change: 4 ✓
- F If a cylinder's radius is doubled, its volume doubles. Change: quadruples ✓
- F $\frac{(A_{\text{base}})(\text{height})}{3}$ is the volume of any prism or cone. Change: pyramid ✓

Multiple Choice (4 KU)

$$\frac{1}{3}\pi r^2(s) = 314.16$$

For questions 6 to 9, select the best answer. Write the letter of your choice in the provided blank space.

- C A cone has a **volume** of 314.16 cm^3 and a **height** of 5 cm. To one decimal place, what is its **radius**?
~~A~~ 20.0 cm ~~B~~ 60.0 cm (C) 7.7 cm ~~D~~ 12.0 cm Too big
 $20^2 = 400$ $60^2 = 3600$ $(12^2)5 = 144(5) = 720$
- b Which of the following is **NOT** an expression for volume? (r =radius, l =length, w =width, h =height, s =distance)
~~A~~ $2lwh + \frac{2}{3}\pi r^3$ (B) $2\pi rs + 3\pi r^2$ ~~C~~ $\frac{1}{2}\pi r^2 h$ ~~D~~ $x^2 h + x^3$
 Surface Area $r = 10$
- a A circular swimming pool has a **diameter of 20 m**. When filled completely the pool holds exactly 100,000 L of water. To one decimal place, what is the height of the pool?
 Note: $1 \text{ L} = 1000 \text{ cm}^3$ $1 \text{ m}^3 = 1000000 \text{ cm}^3$
(a) 0.3 m (b) 3.2 m ~~C~~ 318.3 m ~~D~~ 79.6 m
 $\pi(10^2)h = 100$ $100000 \text{ L} = 100000(1000) \text{ cm}^3 = \frac{100000(1000)}{1000000} \text{ m}^3 = 100 \text{ m}^3$
- C Which statement is **true**?
~~A~~ Corresponding angles are supplementary. ~~B~~ Alternate angles are supplementary.
(C) The circumference of a circle is equal to exactly π diameters. ~~D~~ A triangle with side lengths 3, 4 and 6 is a right triangle.



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Full Solutions/Explanations

10. Fatima and Nistha have a kite-making business that competes with Vyshna's and Uday's VUiTon Fashionable Kites. Their company is called FuNky kites because they specialize in oddly-shaped kites. The shape of one of their funkiest kites is shown at the right. How much material would be needed to make one of these kites? (6 KU)

By the Pythagorean Theorem,

$$h^2 + 16^2 = 34^2$$

$$\therefore h^2 = 34^2 - 16^2$$

$$\therefore h^2 = 900$$

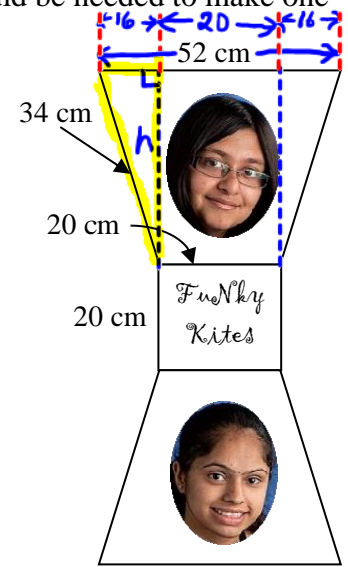
$$\therefore h = 30$$

$$A_{\text{Total}} = 2A_{\triangle} + A_{\square}$$

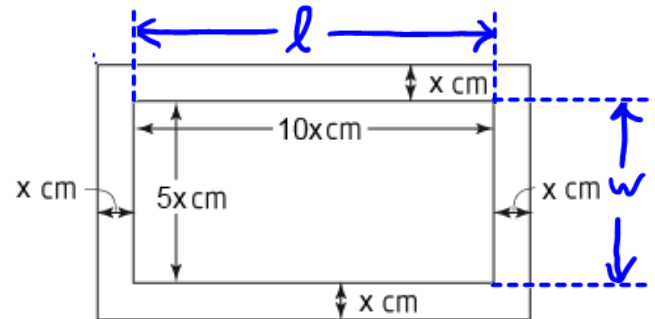
$$= 2\left[\frac{30(52+20)}{2}\right] + 20(20)$$

$$= 2560 \text{ cm}^2$$

About 2560 cm^2 of material are needed.



11. A picture is framed with a frame of unknown width, x cm. The length of the picture is 10 times the width of the frame and the width of the picture is five times the width of the frame. If the perimeter of the picture is 120 cm, find the width of the frame and the dimensions of the picture. (6 APP)



The length of the picture is twice its width. By trial and error (see table), it's easy to determine that the picture has a perimeter of 120 cm when $w=20$ and $l=40$.

w	$l=2w$	P
10	20	60
20	40	120
30	60	180

Since $w=5x$

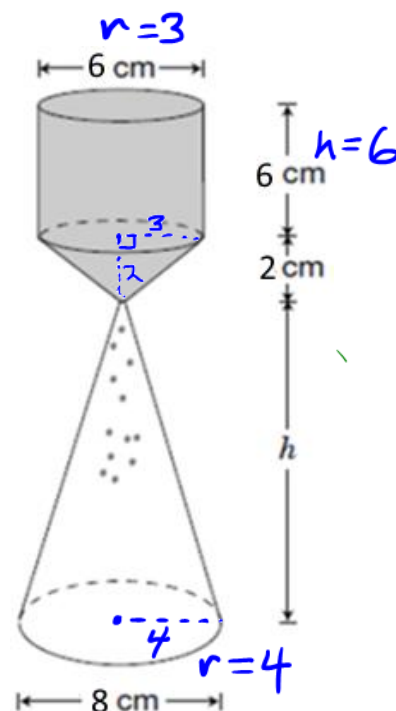
$$5x=20$$

$$\therefore x=4$$

The dimensions of the picture are 40 cm by 20 cm and the width of the frame is 4 cm.

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12. As shown at the right, sand is poured from one container into another. The sand flows from the shaded shape to the unshaded cone. The shaded shape starts full of sand and by the time it is empty, the unshaded cone is filled to the top. What is the height of the unshaded cone? (6 APP)



$$\begin{aligned}
 V_{\text{shaded}} &= V_{\text{cylinder}} + V_{\text{cone}} \\
 &= \pi(3^2)(6) + \frac{1}{3}\pi(3^2)(2) \\
 &= 54\pi + 6\pi \\
 &= 60\pi \approx 188.5 \text{ cm}^3
 \end{aligned}$$

Since the unshaded cone is filled to the top by the time the shaded shape is empty,

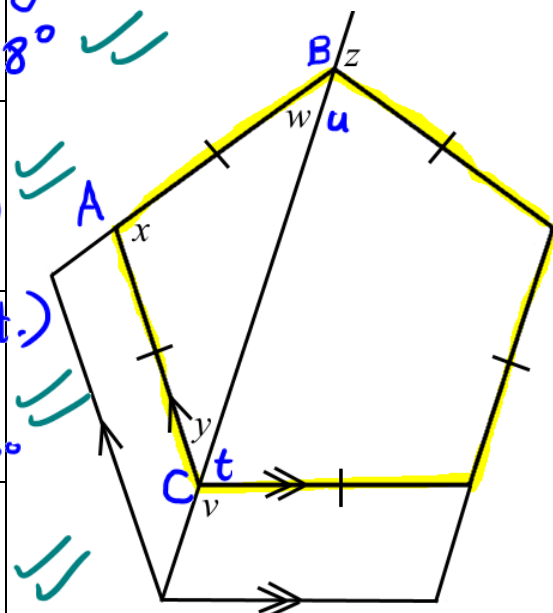
$$\therefore V_{\text{unshaded cone}} = V_{\text{shaded}} = 188.5 \text{ cm}^3 = \frac{\pi(4^2)h}{3} = \frac{16\pi h}{3}$$

$$\therefore h = \frac{3(188.5)}{16\pi} \approx 11.3$$

The height of the unshaded cone is about 11.3 cm.

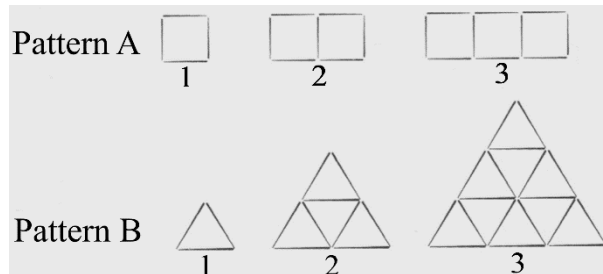
13. Find the measures of each angle labelled with a letter. In each case, state your reasoning. (10 APP)

Angle Measure	Reasoning (State Why)
$x = 108^\circ$	x is the measure of any of the interior angles of the regular pentagon. $\therefore x = \frac{\text{sum of int. angles}}{\# \text{ of int. angles}} = \frac{3(180^\circ)}{5} = 108^\circ$
$y = 36^\circ$	$\triangle ABC$ is isosceles $\therefore y = w = \frac{180^\circ - x}{2}$ (sum of int. angles of \triangle) $= \frac{72^\circ}{2} = 36^\circ$
$z = 108^\circ$	$w + u = 108^\circ$ (int. ang. of reg. pent.) $\therefore u = 108^\circ - 36^\circ = 72^\circ$ $\therefore z$ and u are supplementary, $z = 180^\circ - u = 180^\circ - 72^\circ = 108^\circ$
$w = 36^\circ$	See answer for y
$v = 108^\circ$	$y + t = 108^\circ$ (int. ang. of reg. pent.) $\therefore t = 108^\circ - y = 108^\circ - 36^\circ = 72^\circ$ $\therefore t$ and v are supplementary, $v = 180^\circ - t = 180^\circ - 72^\circ = 108^\circ$



KU	APP	TIPS	COM
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14. Shown at the right are two patterns that are formed by arranging toothpicks. For both patterns, consider the *relation* between the *diagram number (d)* and the *number of toothpicks*. (12 TIPS)



- (a) Complete the following table. (4 TIPS)

Diagram Number (d)	Number of Toothpicks (n)	
	Pattern A	Pattern B
1	4	3
2	7	6
3	10	9
4	13	12

- (b) In words, describe the relationships between n and d for both patterns A and B. (2 TIPS)

Pattern A

When the diagram number increases by 1, the number of toothpicks increases by 3.

OR The number of toothpicks is one more than triple the diagram number.

Pattern B

When the diagram number increases by 1, the number of toothpicks increases by 3 more than the previous time.

- (c) Explain the connection(s) between the following patterns of numbers and the two patterns given above: (4 TIPS)

Diagram Number ① 4, 4+3, 4+3+3, 4+3+3+3, ... Pattern A
 Diagram Number ② 3, 3+6, 3+6+9, 3+6+9+12, ... Pattern B

① This sequence of numbers corresponds to pattern A. The "4" in each sum is the number of toothpicks in diagram 1. The number of "3's" in each sum is the number of times 3 toothpicks must be added to complete the picture.

② This sequence of numbers corresponds to pattern B. Each value in the sum is the number of toothpicks in a particular row.

- (d) For pattern B, how many toothpicks are there in diagram 10? (2 TIPS)

If the pattern continues indefinitely, then in diagram 10 the number of toothpicks should be

$$3 + 6 + 9 + 12 + 15 + 18 + 21 + 24 + 27 + 30 = 165$$

- (e) Bonus Question. You are not required to attempt this question. If you do attempt it and the quality of your response warrants it, you will receive extra credit.

For pattern B, write an equation that relates n to d .

$$n = \frac{3d(d+1)}{2} + 2 \text{ Bonus}$$

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