Geometry Worksheet 3A1

(1) _____ A rectangle's width is 3 units, its length is $(2x + 2)$ units and it has area 48 square units. What is the value of x?

(2) _____ A figure skater is facing north when she begins to spin to her right. She spins 2250 degrees. Which direction (north, south, east or west) is she facing when she finishes her spin?

(3) _____ A 10 unit by 10 unit square is disassembled into unit squares. Two separate squares are then built using all of these unit squares. What is the edge length of the smaller of these two squares?

(4) _____ Brandon has an 8-inch square pan. Barbara has a 9-inch square pan. Both pans have the same volume. What is the ratio of the height of Barbara's pan to the height of Brandon's pan? Express your answer as a common fraction.

(5) _____ A circular spinner to be used in a game is divided by radii into 5 wedge-shaped pieces such that 4 pieces have equal area and the area of the remaining piece is twice the area of any one of the other pieces. How many degrees are in the central angle of the largest piece?

(6) _____ How many different isosceles triangles have integer side lengths and perimeter of 81 units?

(7) _____ A cube has a volume of 343 cubic cm. What is the number of square centimeters in the surface area of the cube?

(8) _____ Each side of hexagon $ABCDEF$ has a length of at least 5 cm and $AB = 7$ cm. How many centimeters are in the least possible perimeter of hexagon $ABCDEF$?

(9) _____ In the diagram shown, $PS = \frac{1}{3}PR$, $PR = \frac{3}{4}PQ$, and $PQ = 40$ cm. What is the number of centimeters in the length of $\overline{SQ}$?

(10) _____ Two cubes have edge lengths of 6 inches and 12 inches. What is the ratio of the surface area of the smaller cube to the surface area of the larger cube? Express your answer as a common fraction.

(11) _____ One stamp is randomly selected from a 10-by-10 sheet of 100 stamps. What is the probability that the stamp selected is not along an outer edge? Express your answer as a common fraction.

(12) _____ A cube has a surface area of 900cm^2. What is the number of cubic centimeters in the volume of the cube? Express your answer in simplest radical form.

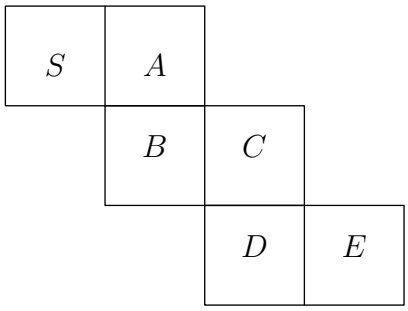
(13) _____ The surface area of a particular cube is 384 square centimeters. In cubic centimeters, what is the volume of the cube?

(14) _____ A telephone pole is supported by a steel cable which extends from the top of the pole to a point on the ground 3 meters from its base. When Leah walks 2.5 meters from the base of the pole toward the point where the cable is attached to the ground, her head just touches the cable. Leah is 1.5 meters tall. How many meters tall is the pole?

(15) _____ It takes 125 identical wooden cubes to fill a cubical box. How many of these cubes does it take to cover the bottom of the box?

(16) _____ The rectangular stage at Radio City Music Hall in New York City measures 144 feet wide and 60 feet deep. What is the number of square yards in its area?

(17) _____ When this net of six squares is folded to make a cube, which face will be opposite face S?



(18) _____ A triangle is formed with sticks of length 8, 15 and 17 inches. Pieces of the same integer length are cut from each stick so that the three remaining pieces can no longer form a triangle. What is the least number of inches that could have been removed from each stick?

(19) _____ The perimeter of a rectangle is 48 units, and its length is twice its width. What is the number of square units in the area of the rectangle?

(20) _____ What is the sum of the number of faces, edges and vertices of a cube?

(21) _____ What is the ratio of the number of degrees in the complement of a 60-degree angle to the number of degrees in the supplement of a 60-degree angle? Express your answer as a common fraction.

(22) _____ The perimeter of a square lot is lined with trees, and there are three yards between the centers of adjacent trees. There are eight trees on a side, and a tree is at each corner. What is the number of yards in the perimeter of the lot?

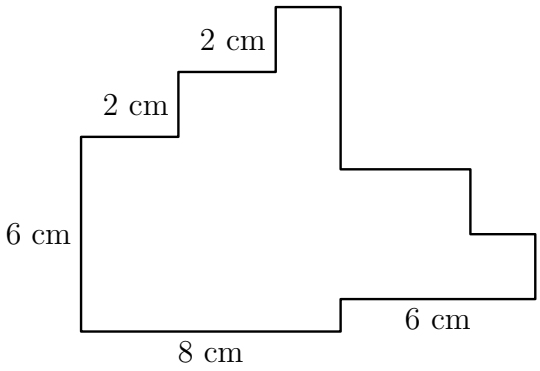
(23) _____ A water tank in the shape of a right circular cylinder has a base radius of 30 meters and a volume of 2700π cubic meters. What is the number of meters in the height of the tank?

(24) _____ The area of a circular plate is 200π cm^2. What is the number of centimeters in the radius of the plate? Express your answer in simplest radical form.

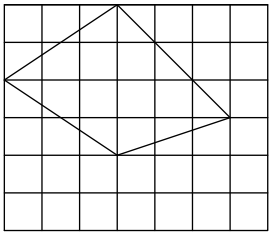
(25) _____ Congruent equilateral triangles are used to tessellate the plane. How many triangles share a common vertex?

(26) _____ How many centimeters are in the length of the longest side of a rectangle whose area is 108 square centimeters and whose perimeter is 42 centimeters?

(27) _____ If adjacent sides meet at right angles in the figure below, what is the number of centimeters in the perimeter of the figure?



(28) _____ What is the area, in square centimeters, of the figure shown?



$\square$ = 1 sq. cm.

Answer Sheet

Number	Answer	Problem ID
1	7	5322
2	east	2322
3	6	0513
4	64/81	ADB41
5	120 degrees	B2A2
6	20	2513
7	294 square centimeters	11D2
8	32	3113
9	30 cm	1DA2
10	1/4	2AA2
11	16/25	A0D4
12	$750\sqrt{6}$	4D4C
13	512 cm^3	A24C
14	9 meters	2B4C
15	25	0BA3
16	960 square yards	A4C1
17	C	44C1
18	6	D1B3
19	128	CD4C
20	26	CAA3
21	1/4	0A4C
22	84	42AC
23	3 meters	B3C1
24	$10\sqrt{2}$ cm	B413
25	6 triangles	42D2
26	12 cm	DCA3
27	48 cm	CC54
28	12 cm	5213

Solutions

(1) **7 ID: [5322]**
No solution is available at this time.

(2) **east ID: [2322]**
Each full circle is 360 degrees. Dividing 360 into 2250 gives a quotient of 6 with a remainder of 90. So, she spins 90 degrees to her right past north, which leaves her facing $\boxed{\text{east}}$.

(3) 6 **ID: [0513]**
No solution is available at this time.

(4) **64/81 ID: [ADB41]**
No solution is available at this time.

(5) **120 degrees ID: [B2A2]**
No solution is available at this time.

(6) 20 **ID: [2513]**
No solution is available at this time.

(7) **294 square centimeters ID: [11D2]**
No solution is available at this time.

(8) **32 ID: [3113]**
No solution is available at this time.

(9) **30 cm ID: [1DA2]**
No solution is available at this time.

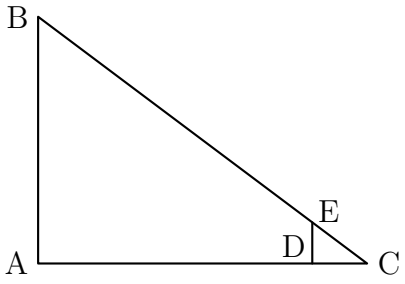
(10) **1/4 ID: [2AA2]**
No solution is available at this time.

(11) **16/25 ID: [A0D4]**
No solution is available at this time.

(12) $750\sqrt{6}$ **ID: [4D4C]**
No solution is available at this time.

(13) **512 cm^3 ID: [A24C]**
The surface area of a cube with edge length e is $6e^2$. Solving $6e^2 = 384$ gives $e = \sqrt{384/6} = 8$ centimeters. The volume of a cube with edge length 8 cm is $(8\text{ cm})^3 = \boxed{512}$ cubic centimeters.

(14) **9 meters ID: [2B4C]**
First, let us draw a diagram (not to scale!):



Here, AB is the telephone pole and C is the point in the ground where the cable BC is anchored. The key is to recognize that ABC is a right triangle since the telephone pole is upright. Meanwhile, Leah stands at D and touches the cable at E, so DEC is another right triangle. Not only that, but we see that $\triangle ABC \sim \triangle DEC$ thanks to AA similarity.

From the problem, We have that $DE = 1.5\text{m}$, $AC = 3\text{m}$, and $AD = 2.5\text{m}$. Therefore, $DC = AC - AD = 0.5\text{m}$. We desire AB. From $\triangle ABC \sim \triangle DEC$, we get:

$$\frac{AB}{AC} = \frac{DE}{DC}$$
$$\frac{AB}{3\text{m}} = \frac{1.5\text{m}}{0.5\text{m}} = 3$$
$$AB = 3 \cdot 3\text{m} = \boxed{9}\text{ meters.}$$

(15) **25 ID: [0BA3]**

No solution is available at this time.

(16) **960 square yards ID: [A4C1]**

No solution is available at this time.

(17) **C ID: [44C1]**

No solution is available at this time.

(18) **6 ID: [D1B3]**

No solution is available at this time.

(19) **128 ID: [CD4C]**

No solution is available at this time.

(20) **26 ID: [CAA3]**

A cube has four sides, a top, and a bottom for 6 faces.

It has four vertices on the top and four on the bottom for a total of 8.

It has four edges on the top, four on the bottom, and four connecting them, for a total of 12.

So the sum is $6 + 8 + 12 = \boxed{26}$.

(21) **1/4 ID: [0A4C]**

No solution is available at this time.

(22) **84 ID: [42AC]**

No solution is available at this time.

(23) **3 meters ID: [B3C1]**

Let the height measure h meters. By the formula for area of a cylinder, which states that $V = \pi r^2 h$ where V, r, h denote volume, radius and height respectively, we have

$$2700\pi = \pi(30)^2 h.$$

Solving yields $h = \boxed{3}$ meters.

(24) $10\sqrt{2}$ **cm** **ID: [B413]**
No solution is available at this time.

(25) **6 triangles** **ID: [42D2]**
No solution is available at this time.

(26) **12 cm** **ID: [DCA3]**
No solution is available at this time.

(27) **48 cm** **ID: [CC54]**
No solution is available at this time.

(28) 12 **cm** **ID: [5213]**
No solution is available at this time.