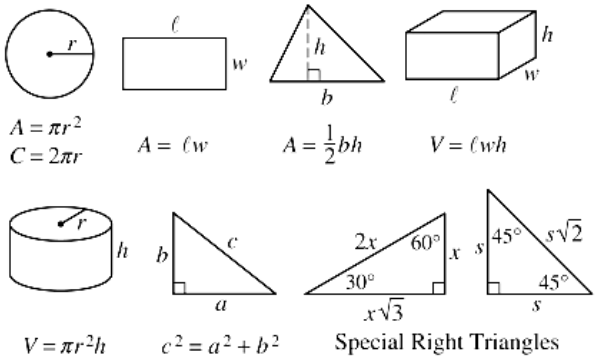
7th & 8th Grade Math Drills #4

Part 1: Need-To-Know Math

Need-To-Know Math - Please review before taking the Test



$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

$A = \frac{1}{2}bh$

$V = \ell wh$

$V = \pi r^2 h$

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

Special Right Triangles

The number of degrees of arc in a circle is 360.
The sum of the measures in degrees of the angles of a triangle is 180.

1. Multiplication Tables. Know:

-Full times tables through 12 * 12

-15 times table through 15 * 10

Perfect Squares:

1 x 1 = 1
2 x 2 = 4
3 x 3 = 9
4 x 4 = 16
5 x 5 = 25
6 x 6 = 36
7 x 7 = 49
8 x 8 = 64
9 x 9 = 81
10 x 10 = 100
11 x 11 = 121
12 x 12 = 144
13 x 13 = 169
14 x 14 = 196
15 x 15 = 225

20 x 20 = 400
25 x 25 = 625

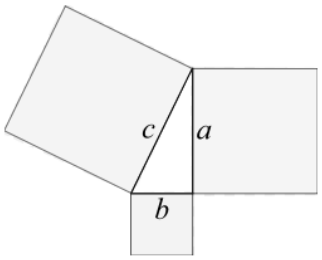
15 Times Table (through 7) :

15 x 2 = 30
15 x 3 = 45
15 x 4 = 60
15 x 5 = 75
15 x 6 = 90
15 x 7 = 105

2. Exponent Rules (memorize):

$a^m * a^n = a^{(m+n)}$
$a^m/a^n = a^{(m-n)}$
$(a^m)^n = a^{(m*n)}$
$a^{-n} = 1/a^n$
$a^{(1/2)} = \sqrt{a}$
$(ab)^m = a^m * b^m$

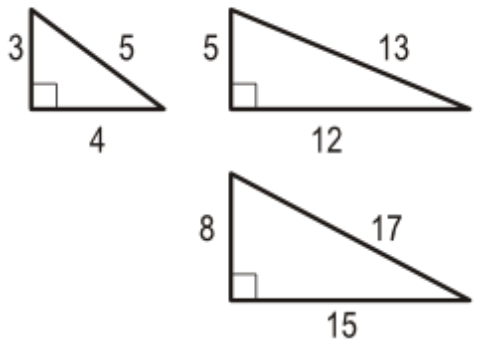
3. Pythagorean Theorem



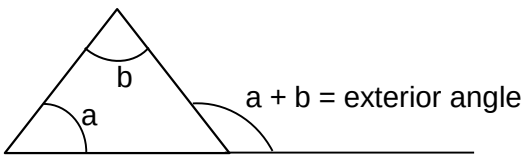
$a^2 + b^2 = c^2$
$c = \sqrt{a^2 + b^2}.$
Pythagorean theorem

4. Perfect Right Triangles:

3, 4, 5 (and 6, 8, 10 – any 3x : 4x : 5x ratio works)
5, 12, 13
8, 15, 17



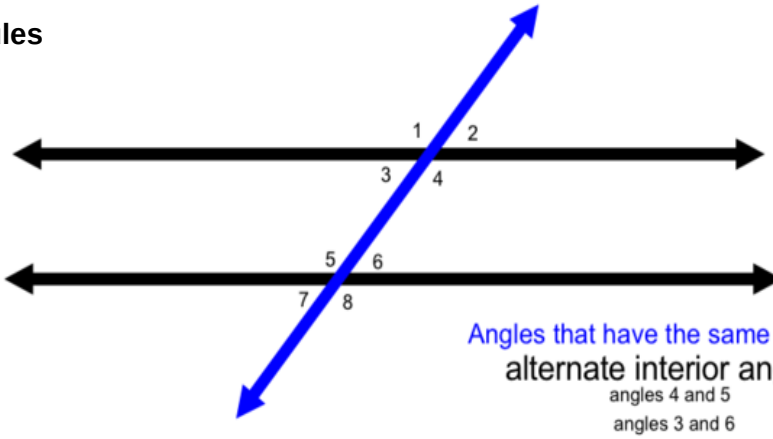
5. An exterior angle of a triangle is equal to the sum of the two non-adjacent interior angles of the triangle.



6. Shaded area problems should always be done by subtraction:

(area of whole shape) – (area of un-shaded shape) = (area of shaded shape)

7. Angle Rules



Angles that have the same measure:

alternate interior angles
angles 4 and 5
angles 3 and 6

interior angles
angles 3, 4, 5, and 6

alternate exterior angles
angles 1 and 8
angles 2 and 7

exterior angles
angles 1, 2, 7, and 8

corresponding angles
angles 1 and 5
angles 2 and 6
angles 3 and 7
angles 4 and 8

8. Prime Numbers:
The number 1 is neither prime nor composite.
Number 2 is the only prime even number.
The prime numbers less than 50:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47

9. Definition of absolute value:
"the magnitude of a real number without regard to its sign". $|x| = \begin{cases} x \text{ if } x > 0 \\ -x \text{ if } x < 0 \end{cases}$

10. Similar Triangles:
Two triangles are similar if two angles of the triangle are equal or if all sides of one triangle are proportional to the sides of another triangle.
(cf. AA theorem, SSS theorem, and SAS theorem for similar triangles.)
The order of the angles matters. For example: 30-60-90 triangle ABC cannot be similar to both triangle DEF and triangle FED.

Instructions for Math Drill #4

22 Questions / 30 Minutes

- Solve each problem. Find the best answer among the answer choices given.
- You can do your figuring on the test or a separate sheet of paper, but ***not*** on the bubble answer sheet.
- Mark a "T" beside questions that eat up your time. Mark a "?" next to questions you guess on.
- Circle your answer choices on the test, then transfer your answers to the bubble answer sheet page by page as you progress through the test.
- There is no guessing penalty, so answer all questions.
- Don't get hung up on any one question… do a best guess and move on. Return to the problem later as time allows.

Important Notes:

1. Diagrams are not necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.
2. Assume that a diagram is in one plane unless the problem specifically states that it is not.
3. Reduce all fractions to lowest terms.

Symbols, Formulas, and Indicators

The following formulas and other reference information may be of use while solving the problems. You may refer to this information as needed during the test.

Symbols:

$\neq$	is not equal to
$<$	is less than
$>$	is greater than
$\leq$	is less than or equal to
$\geq$	is greater than or equal to
$//$	is parallel to
$\perp$	is perpendicular to

Indications:

Angles are indicated by  .

Right angles are indicated by  .

Formulas:

Circumference of a circle with radius r: $2\pi r$
Sum of the measures of the interior of a triangle = 180 degrees
Sum of the measure of the interior angle of a quadrilateral = 360 degrees
Area of a triangle with base, b, and height, h: $\frac{1}{2}bh$
Area of a parallelogram with base, b, and height, h: bh
Area of trapezoid with parallel sides a and b, and height h: $\frac{1}{2}(a+b)h$
Area of a circle with radius, r: πr^2

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Mathematics Problems

Questions 1 -22

DIRECTIONS: Circle your answer choices on the test, then transfer your answers to the bubble answer sheet page by page as you progress through the test.

1. What is the difference between 5% of 50 and 50% of 5?

A. 0
B. 2.5
C. 1.37
D. 25
E. 45

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2. Penny jogs at $\frac{3}{4}$ or Veronica's pace. If Penny and Veronica started jogging at the same time and Penny jogged 6 miles, how many miles did Veronica jog?

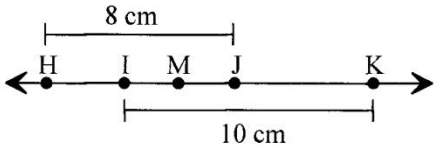
A. 4
B. 4.5
C. 6.75
D. 8
E. 10

---

3. G is an element of the set [0.4, 0.6, 0.7, 2, 2.6], and $\frac{0.8G}{0.12}$ is an integer. What is G?

A. 0.4
B. 0.6
C. 0.7
D. 2
E. 2.6

4.



On the line above, $\overline{IM} = 2\ cm$, and $\overline{IM} = \overline{MJ}$, then what is the length of $\overline{HK}$?

A. 10 cm
B. 12 cm
C. 14 cm
D. 16 cm
E. 18 cm

---

5. A magician has x balloons in his left pocket. In both his left and right pocket he has $2x + 4$ balloons. In terms of x, how many balloons does the magician have in his right pocket?

A. $3x - 4$
B. $\frac{x}{3} + 4$
C. $3x + 4$
D. $x - 4$
E. $x + 4$

---

6. There are 1,000 cars in a dealership. Of a sample of 10 cars 3 were silver and 1 was red. Using only this information what is the best estimate for the amount of cars at the dealership that are **neither** silver or red.

A. 200
B. 300
C. 400
D. 500
E. 600

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7. A jar of candy is being distributed. The jar contains 14 gumdrops, 18 chocolates, and 8 mints. If a person randomly draws one gumdrop and one chocolate, what is the probability of the next candy pulled out of the jar is a mint?

A. $\frac{1}{40}$
B. $\frac{1}{5}$
C. $\frac{1}{2}$
D. $\frac{4}{19}$
E. $\frac{7}{38}$

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8. A football offense is on the 3 yard line from the goal. The offensive line has an illegal formation and is moved 5 yards back (away from the goal). A penalty on the defense then causes the offense to move half the distance to the goal. At what yard line is the offense's next play?

A. 1 yard
B. 2 yard
C. 4 yard
D. 5 yard
E. 8 yard

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9. A 12 foot tall plant will grow half its height each year. How many years will it take for the plant to reach over 30 feet?

A. 1 year
B. 2 years
C. 3 years
D. 4 years
E. 5 years

---

10. There are 5280 feet in a mile, there are about 1.6 kilometers in a mile. How many feet is one kilometer?

A. 2700 feet
B. 3300 feet
C. 8448 feet
D. 4234 feet
E. 4400 feet

---

11. Simplify:

$x\left[\left(\frac{2x-2}{x+z}\right)\left(\frac{x+z}{x-1}\right)\right]$, where $x \neq z$ and $x \neq 1$.

A. x
B. $2x$
C. $\left(\frac{2x-2}{x-1}\right)$
D. $x+z$
E. $x(2x-2)(x+z)$

---

12. Between which two consecutive positive integers is $\sqrt{9^2+8^2}$

A. 8 and 9
B. 9 and 10
C. 11 and 12
D. 12 and 13
E. 13 and 15

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13. What is the perimeter of a circle with the area 16π?

A. 4π
B. 8π
C. 32π
D. 64π
E. 128π

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14. Given the set {1, 2, 3, …, 64, 65, 66}, how many numbers in the set above have 6 as a factor but do not have 4 as a factor?

A. 5
B. 6
C. 7
D. 8
E. 11

---

15. How many square yards of tile would it take to tile a 27' × 36' room?

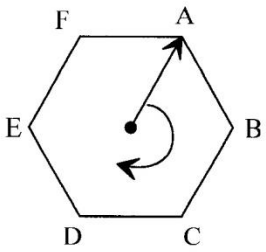
A. 81 sq yd
B. 108 sq yd
C. 160 sq yd
D. 500 sq yd
E. 972 sq yd

---

16. A drawer contains 11 pairs of black socks, 8 pairs of white socks, and 7 pairs of brown socks. Peggy removed 8 pairs of socks, 1 of which was black. She pulls out one more pair at random – What is the probability that the next sock is black?

A. $\frac{11}{26}$
B. $\frac{5}{13}$
C. $\frac{5}{9}$
D. $\frac{4}{9}$
E. $\frac{1}{18}$

17.



ABCDEF is a regular hexagon. The arrow inside rotates at a rate of 1/3 revolutions per minute. If the arrow begins at A and 10 minutes elapse, where will the arrow be pointing?

A. B
B. C
C. D
D. E
E. F

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18. A driveway measuring 4 yards wide by 6 yards long was covered with 6 inches of snow. How many cubic **feet** of snow was there on the driveway?

A. 1296 cu ft
B. 216 cu ft
C. 108 cu ft
D. 12 cu ft
E. 144 cu ft

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19. A vote between two policies was won by 75% of the 2,000 ballots received. What was the ballot difference between the two policies?

A. 250
B. 500
C. 750
D. 1000
E. 1250

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20. A circle shares tangents along both the x and y axis of a standard coordinate system. Of the choices below what could **not** be a possible coordinate on the circle?

A. (-4, -4)
B. (0, 15)
C. (15, 0)
D. (10, 10)
E. (0, 0)

---

21. In a scale diagram each half inch equals 10 feet. How many square inches on the diagram equal 1 square foot?

A. 0.05 sq in
B. 0.005 sq in
C. 0.25 sq in
D. 0.025 sq in
E. 0.0025 sq in

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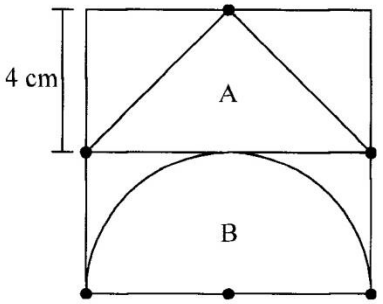
22. Given the figure:

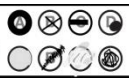


If the total figure was in a perfect square, what is the area of A + B?

A. $4\pi + 32$
B. $64\pi + 16$
C. 24π
D. $8\pi + 16$
E. $48 - 8\pi$

THIS IS THE END OF THE TEST. ANSWER KEY IS ON THE NEXT PAGE.

Answer Sheet

COMPLETE MARK ●	EXAMPLES OF INCOMPLETE MARKS 	*You must use a No. 2 pencil and marks must be complete. Do not use a mechanical pencil. It is very important that you fill in the entire circle darkly and completely. If you change your response, erase as completely as possible. Incomplete marks or erasures may affect your score.*

1	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**11**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**21**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
2	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**12**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**22**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
3	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**13**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
4	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**14**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
5	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**15**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
6	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**16**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
7	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**17**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
8	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**18**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
9	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**19**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						
10	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	**20**	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ						

ANSWERS – Drill #4

1- A
2- D
3- B
4- C
5- E
6- E
7- D
8- C
9- C
10- B
11- B
12- D
13- B
14- C
15- B
16- C
17- B
18- C
19- D
20- E
21- E
22- D

