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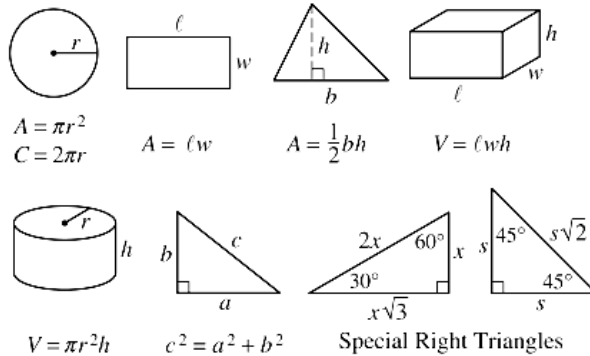
The number of degrees of arc in a circle is 360.
The sum of the measures in degrees of the angles of a triangle is 180.

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
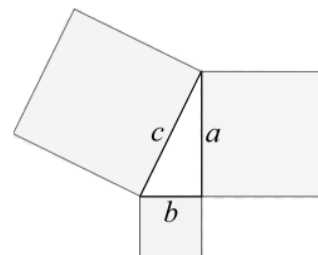14 x 14 = 196
15 x 15 = 225

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
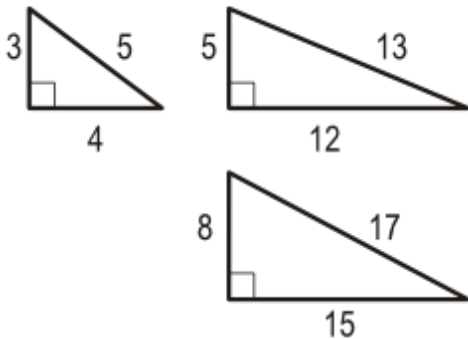

$a^2 + b^2 = c^2$
$c = \sqrt{a^2 + b^2}.$
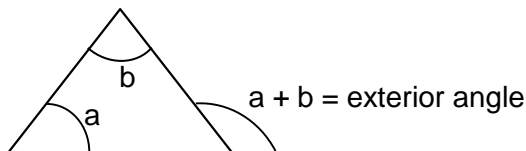Pythagorean theorem

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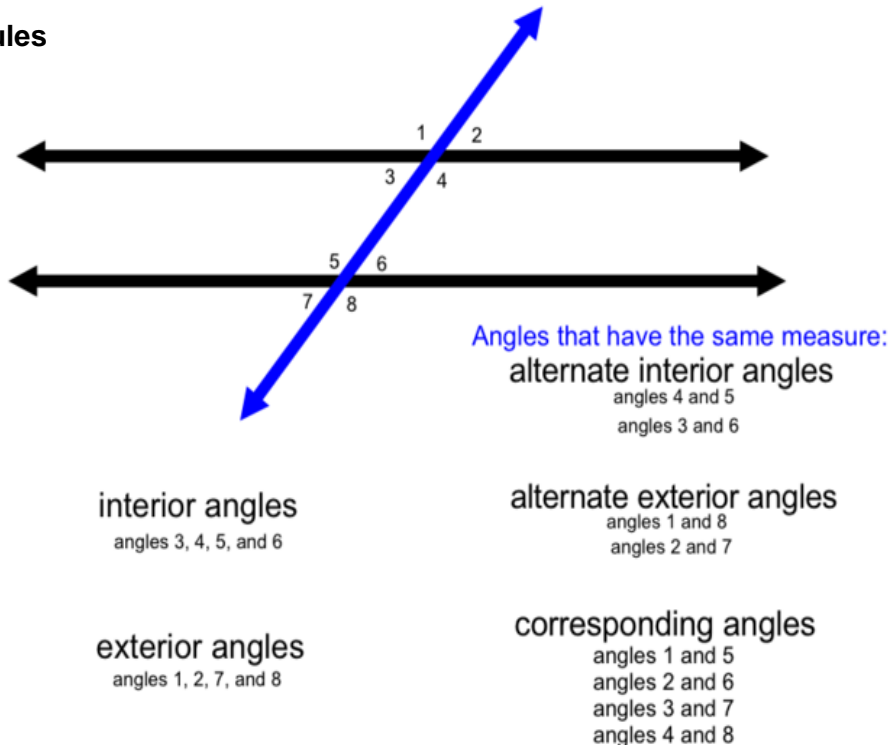
3, 4, 5 (and 6, 8, 10 – any 3x : 4x : 5x ratio works)
5, 12, 13
8, 15, 17

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

a + b = exterior angle

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 #1
25 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

Mathematics Problems

Questions 1 -25

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. Heather is trying to beat Rick's three-game average of 150 points playing ski-ball. Her first game scored 120 points, the second scored 190. How many points does she need to score on her third game to tie with Rick and move in to overtime?

    A. 130 points
    B. 140 points
    C. 150 points
    D. 160 points
    E. 170 points

2. $3 \div \frac{2}{3} =$

    A. 2
    B. 1.5
    C. 4.5
    D. 9
    E. 18

3.
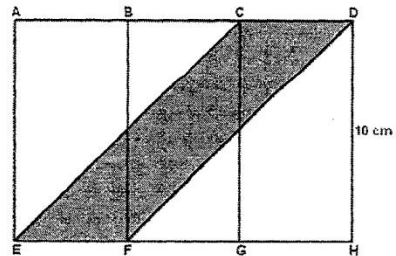
$ACGE$ and $BDHF$ are both squares. $\overline{EFGH}$ is a straight segment. $\overline{CE}$ bisects $\overline{BF}$ and $\overline{DF}$ bisects $\overline{CG}$. What is the area of the shaded region?

    A. 25 sq. cm.
    B. 50 sq. cm.
    C. 75 sq. cm.
    D. 90 sq. cm.
    E. 100 sq. cm.

4. A length of masking tape measuring 125 centimeters is torn in to five pieces. The first piece measures 55 cm; the next two are each 10 cm. The last two pieces are equal in length. What is the length of the last piece of tape?

    A. 25 cm.
    B. 35 cm.
    C. 50 cm.
    D. 55 cm.
    E. 75 cm.

5. Rachel's lab assistant misplaced her last test subject's weight data. She knows the average weight of the five subjects was 140 lbs. The first four subjects weighed 210, 130, 145, and 115 lbs., respectively. What was the last subject's weight?

    A. 100 lbs.
    B. 115 lbs.
    C. 120 lbs.
    D. 125 lbs.
    E. 140 lbs.

6. Given: $6x + 3y + 3 = 12$.

What is the value of y, in terms of x?

    A. $9 - x$
    B. $9 - 2x$
    C. $3 - 2x$
    D. $5 - 2x$
    E. $5 - x$

7. Given: $x = y + 3$.

Find: $2x - 3$, in terms of y.

    A. $2y + 9$
    B. $6y - 3$
    C. $2y - 6$
    D. $2y - 9$
    E. $2y + 3$

8. Hilary is 24 years old. In 12 years she will be half the age of her uncle. How old is her uncle currently?

    A. 28 years
    B. 30 years
    C. 36 years
    D. 60 years
    E. 72 years

9.

Number of Radios in a Sample of 500 Offices
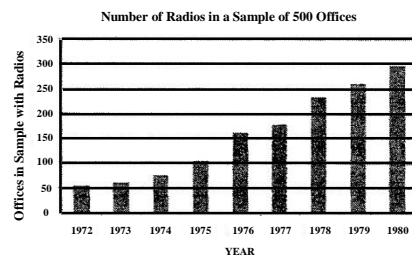
Based on the graph above, what was the first year that over half the sampled offices had radios?

    A. 1976
    B. 1977
    C. 1978
    D. 1979
    E. 1980

10. A 15-sided polygon has six sides at x cm, five sides are $3x$ cm, two sides are $2x$ cm. The other sides are 4 and 16 cm. The perimeter of the polygon is 120 cm, what is x?

    A. 1 cm
    B. 1.5 cm
    C. 2 cm
    D. 3 cm
    E. 4 cm

CONTINUE ON TO THE NEXT PAGE ▶

11. When the number, x, is divided by 7 its remainder is 3. What is the remainder when $x + 10$ is divided by 7?

- A. 2
- B. 3
- C. 4
- D. 5
- E. 6

12. A rectangular table measures 3×9 feet. The tablecloth on the table hangs one foot off each side. What is the area of the tablecloth?

- A. 27 sq. ft.
- B. 40 sq. ft.
- C. 55 sq. ft.
- D. 60 sq. ft.
- E. 72 sq. ft.

13. What is the value of $(x - y)(y - x)$, where $x = 9, y = 2$.

- A. 7
- B. 14
- C. 49
- D. -7
- E. -49

14. What is the greatest prime factor of 195?

- A. 3
- B. 5
- C. 7
- D. 13
- E. 17

15. What is added to the value 2.067 to raise it to the nearest tenth?

- A. 0.003
- B. 0.033
- C. 1.003
- D. 1.033
- E. 0.1

16.

Intersecting Lines
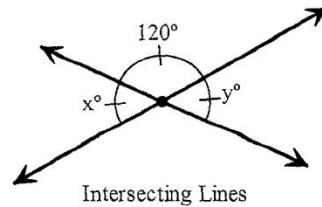
Based on the figure of intersecting lines, what is the sum of $x + y$?

- A. 60°
- B. 90°
- C. 120°
- D. 240°
- E. 270°

17. x is an integer; what **must** be an odd number?

- A. $x + 1$
- B. $2x$
- C. $x + 2$
- D. $2x + 1$
- E. $2x + 2$

18. $3x(5y + 1) =$

- A. $15xy + 3x$
- B. $15xy + 3x + 1$
- C. $8xy + 3x$
- D. $8xy + 1$
- E. $5y + 3x$

CONTINUE ON TO THE NEXT PAGE ▶

19. B is 25% of C, and C is 20% of 500. What is the value of B?

A. 25
B. 30
C. 50
D. 100
E. 500

20.
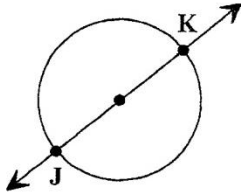
The figure above depicts a straight line bisecting a circle at points J and K. If the distance from J to K is 4 inches, what is the circumference of the circle?

A. 4π inches
B. $4\pi^2$ inches
C. 8π inches
D. 16π inches
E. 64π inches

21. Q is an element of the set $[0.1, 0.5, 1.5, 3.0, 5.0]$, and $\frac{1.4Q}{2.1}$ is an integer. What is Q?

A. 0.1
B. 0.7
C. 1.5
D. 3.0
E. 5.0

22. Greg is x years old now, Kate is 30 years older than Greg. In 5 years Kate will be twice as old as Greg is then. How old is Greg now?

A. 8
B. 14
C. 20
D. 25
E. 33

23. What is the difference between 50% of 60 and 60% of 50?

A. 0
B. 2
C. 4.25
D. 5
E. 10

24. John's top spun $\frac{3}{4}$ as many rotations as Kevin's top. Kevin spun his top $5\frac{1}{2}$ rotations. How many rotations did John's top spin?

A. $2\frac{5}{8}$
B. $4\frac{1}{8}$
C. $4\frac{3}{4}$
D. $4\frac{7}{8}$
E. $8\frac{4}{5}$

25.

Daily Guests								
Day	1	2	3	4	5	6	7	8	9
Guests	12	32	22	15	33	25	21	25	45

What was the median number of guests for the days shown?

A. 21
B. 25
C. $25\frac{5}{9}$
D. 30
E. 33

THIS IS THE END OF THE TEST.

INSPIRING Test Preparation

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. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
6. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
7. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
8. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
9. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
10. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

11. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
12. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
13. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
14. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
15. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
16. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
17. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
18. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
19. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
20. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

21. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
22. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
23. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
24. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
25. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

ANSWERS – Drill #1

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