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Example 1:	2×6	$2 + 6$	● Ⓑ Ⓒ Ⓓ Ⓔ

Examples 2-4 refer to $\triangle PQR$.

	Column A	Column B	
Example 2:	PN	NQ	Ⓐ Ⓑ Ⓒ ● Ⓔ

(since equal measures cannot be assumed, even though PN and NQ appear equal)

| **Example 3:** | x | y | Ⓐ ● Ⓒ Ⓓ Ⓔ |

(since N is between P and Q)

| **Example 4:** | $w + z$ | 180 | Ⓐ Ⓑ ● Ⓓ Ⓔ |

(since PQ is a straight line)

	Column A	Column B
1.	3^4	4^3

$$x = 2y + 3$$
$$y = -2$$

	Column A	Column B
2.	x	-1

$d = 5.03894$ and $\boxed{d}$ is the decimal expression for d rounded to the nearest thousandth.

| 3. | The number of decimal places where d and $\boxed{d}$ differ | 4 |

$$x + 2y > 8$$

| 4. | $2x + 4y$ | 20 |
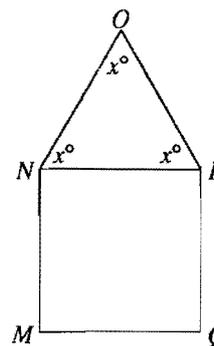
Square $MNPQ$ has area 36.

| 5. | The perimeter of pentagon $MNOPQ$ | 30 |

p and q are different prime numbers. r is the least prime number greater than p, and s is the least prime number greater than q.

| 6. | $r - p$ | $s - q$ |

A if the quantity in Column A is greater;
B if the quantity in Column B is greater;
C if the two quantities are equal;
D if the relationship cannot be determined
from the information given.

Column A	Column B

$$|-3| = -m$$

7. m 3

---

n is an even integer and a multiple of 3.

8. The remainder when n 6
is divided by 12
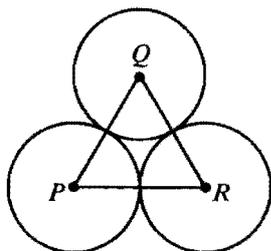
Equilateral triangle PQR is formed by joining
centers P, Q, and R of the circles. Each pair
of circles has exactly one point in common.

9. The perimeter of   The circumference of
triangle PQR the circle with center Q

---

10. The volume of a cylin-   The volume of a cylin-
drical tank that has a   drical tank that has a
radius of 2 meters and a   radius of 1 meter and a
height of 10 meters   height of 20 meters

$$ds \neq 0$$

11. The time required to   The time required to

travel d miles at s travel $\frac{d}{2}$ miles at $2s$

miles per hour   miles per hour

$\triangle RST$ is isosceles and $\angle RST = 40°$.

12. The sum of the measures   120°
of the two angles of $\triangle RST$
that have equal measure

---

13. $\sqrt{x^4 + 6x^2 + 9}$ $x^2 + 3$

Column A	Column B
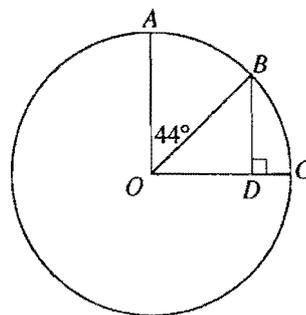
O is the center of the circle and $\angle AOC$ is a
right angle.

14. OD BD

Before Maria changed jobs, her salary was
24 percent more than Julio's salary. After Maria
changed jobs, her new salary was 24 percent less
than her old salary.

15.   Julio's salary   Maria's new salary

Directions: Each of the Questions 16-30 has five answer
choices. For each of these questions, select the best of the
answer choices given.

16. $(19 - 18 - 17 - 16) - (20 - 19 - 18 - 17) =$

   (A) -36
   (B) -6
   (C) -4
   (D) 1
   (E) 2

17. If $3x - 2 = 7$, then $4x =$

   (A) 3

   (B) 5

   (C) $\frac{20}{3}$

   (D) 9

   (E) 12

18. Of the following, which is closest to $\sqrt[3]{30}$?

   (A) 6
   (B) 5
   (C) 4
   (D) 3
   (E) 2

GO ON TO THE NEXT PAGE.

Weight (pounds) vs Age (years)
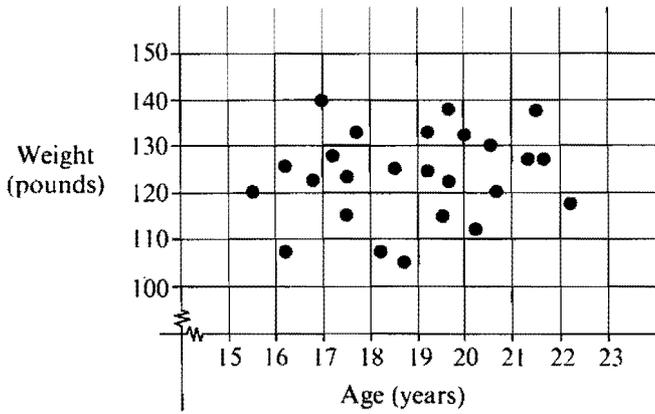
19. The dots on the graph above indicate age and weight for a sample of 25 students. What percent of these students are less than 19 years old and weigh more than 110 pounds?

(A) 36%   (B) 40%   (C) 44%
        (D) 48%   (E) 52%

20. The greatest number of diagonals that can be drawn from one vertex of a regular 6-sided polygon is

(A) 2   (B) 3   (C) 4
        (D) 5   (E) 6

Questions 21-25 refer to the following graphs.

AVERAGE DAILY CIRCULATION FOR NEWSPAPER X
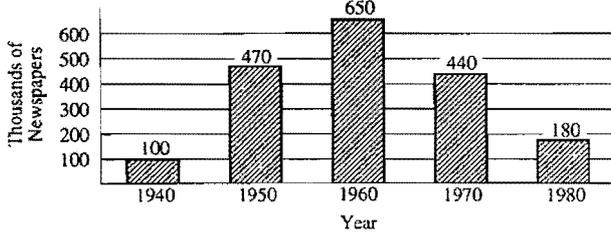
TOTAL YEARLY ADVERTISING REVENUE FOR NEWSPAPER X
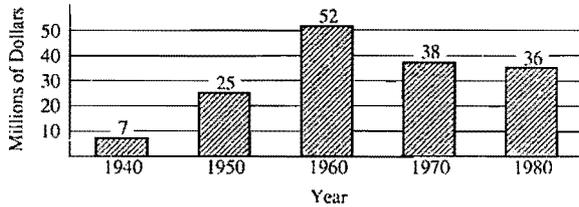
AVERAGE NUMBER OF PAGES PER NEWSPAPER FOR NEWSPAPER X
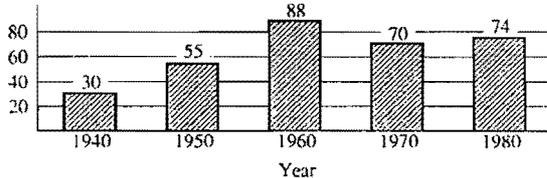
21. In how many of the years shown was the average number of pages per newspaper at least twice as much as the average in 1940 ?

(A) Four
(B) Three
(C) Two
(D) One
(E) None

22. In 1950, if the printing cost per newspaper was $0.05, what would have been the total cost of printing the average daily circulation?

(A) $32,500
(B) $26,000
(C) $23,500
(D) $22,000
(E) $2,600

23. In 1980 the number of dollars of advertising revenue was how many times as great as the average daily circulation?

(A) 500
(B) 200
(C) 100
(D) 50
(E) 20

24. The percent decrease in average daily circulation from 1960 to 1970 was approximately

(A) 10%
(B) 12%
(C) 20%
(D) 26%
(E) 32%

25. Which of the following statements can be inferred from the data?

I. The greatest increase in total yearly advertising revenue over any 10-year period shown was $27 million.
II. In each of the 10-year periods shown in which yearly advertising revenue decreased, average daily circulation also decreased.
III. From 1970 to 1980 the average number of pages per newspaper increased by 10.

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

26. If $0 < st < 1$, then which of the following can be true?

(A) $s < -1$ and $t > 0$
(B) $s < -1$ and $t < -1$
(C) $s > -1$ and $t < -1$
(D) $s > 1$ and $t < -1$
(E) $s > 1$ and $t > 1$

W   X   Y   Z

27. On segment WZ above, if $WY = 21$, $XZ = 26$, and YZ is twice WX, what is the value of XY?

(A) 5
(B) 10
(C) 11
(D) 16
(E) It cannot be determined from the information given.

28. To reproduce an old photograph, a photographer charges x dollars to make a negative, $\frac{3x}{5}$ dollars for each of the first 10 prints, and $\frac{x}{5}$ dollars for each print in excess of 10 prints. If $45 is the total charge to make a negative and 20 prints from an old photograph, what is the value of x?

(A) 3
(B) 3.5
(C) 4
(D) 4.5
(E) 5

29. Which of the following is equal to $\frac{1}{4}$ of 0.01 percent?

(A) 0.000025
(B) 0.00025
(C) 0.0025
(D) 0.025
(E) 0.25
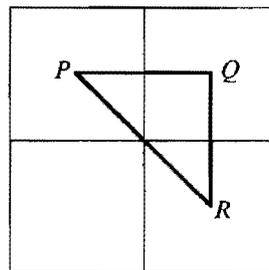
30. In the figure above, each of the four squares has sides of length x. If $\triangle PQR$ is formed by joining the centers of three of the squares, what is the perimeter of $\triangle PQR$ in terms of x?

(A) $2x\sqrt{2}$

(B) $\frac{x\sqrt{2}}{2} + x$

(C) $2x + \sqrt{2}$

(D) $x\sqrt{2} + 2$

(E) $2x + x\sqrt{2}$

STOP

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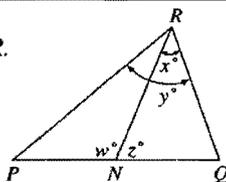
	Column A	Column B	
Example 2:	PN	NQ	Ⓐ Ⓑ Ⓒ ● Ⓔ

(since equal measures cannot be assumed, even though PN and NQ appear equal)

| **Example 3:** | x | y | Ⓐ ● Ⓒ Ⓓ Ⓔ |

(since N is between P and Q)

| **Example 4:** | w + z | 180 | Ⓐ Ⓑ ● Ⓓ Ⓔ |

(since PQ is a straight line)

	Column A	Column B
1.	The number of months in 7 years	The number of days in 12 weeks
2.	$1 - \dfrac{1}{27}$	$\dfrac{8}{9} + \dfrac{1}{81}$
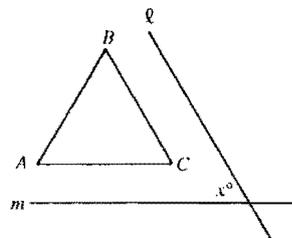
△ABC is equilateral. Line ℓ is parallel to side BC and line m is parallel to side AC.

3.	x	60

$$r > s > 0$$

4.	$\dfrac{rs}{r}$	$\dfrac{rs}{s}$

The circumference of circle C is 18π.

5.	The diameter of circle C	9

6.	9^7	10,000,000

The volume of a cube is 64.

7.	The area of the base of the cube	32

t is a positive integer.

$$\frac{4}{7} = \frac{t}{s}$$

8.	s	7

9.	$(0.82)^2(0.82)^3$	$(0.82)^6$

For all real numbers a, let $a^* = 1 - a$.

10.	$((-1)^*)^*$	2^*

GO ON TO THE NEXT PAGE.

A if the quantity in Column A is greater;
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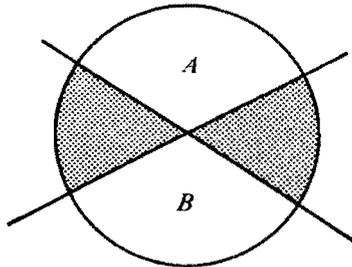
The areas of the two shaded regions of the circle are equal.

11. The area of unshaded   The area of unshaded
    region A of the circle   region B of the circle

$x \neq 0$

12. $\dfrac{x}{|x|}$ 1

Team X scored p points more than team Y, and the two teams together scored a total of 10 points.

13. Twice the number of $10 - p$
    points team Y scored

14. $(x - 1)(x)(x + 1)$ $(x)(x)(x)$
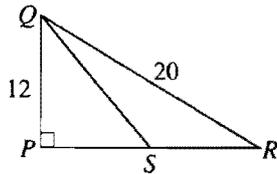
The area of $\triangle PQS$ is 45.

15. The length of   The length of
    segment PS segment SR

16. In a certain shop, notebooks that normally sell for 59 cents each are on sale at 2 for 99 cents. How much can be saved by purchasing 10 of these notebooks at the sale price?

(A) $0.85   (B) $0.95   (C) $1.10
      (D) $1.15   (E) $2.00

17. Which of the following is a solution to $x + x^2 = 1$?

(A) -1

(B) 0

(C) $\dfrac{1}{2}$

(D) 1

(E) None of the above
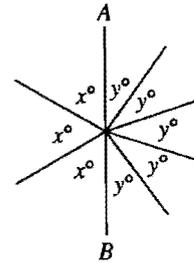
18. In the figure above, AB is a line segment. What is the value of $\dfrac{x - y}{x + y}$?

(A) $\dfrac{5}{24}$ (B) $\dfrac{1}{4}$ (C) $\dfrac{7}{16}$ (D) $\dfrac{11}{24}$ (E) $\dfrac{7}{13}$

19. If the average (arithmetic mean) of 5 consecutive integers is 12, what is the sum of the least and greatest of the 5 integers?

(A) 24   (B) 14   (C) 12   (D) 11   (E) 10
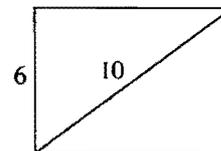
20. What is the perimeter of the rectangle shown above?

(A) 14   (B) 24   (C) 28   (D) 38   (E) 48

GO ON TO THE NEXT PAGE.

PROFILE OF CONGRESS IN YEAR X
(total membership: 535)

House of Representatives		Senate

Party

292	Democratic	62
143	Republican	38
435	Total	100

Sex

418	Male	100
17	Female	0

Age

27	Youngest	34
77	Oldest	80
48	Average (arithmetic mean)	54

Religion

255	Protestant	69
107	Catholic	12
18	Jewish	5
4	Mormon	3
51	Other	11

House of Representatives		Senate

Profession

215	Lawyer	63
81	Business Executive or Banker	15
45	Educator	6
14	Farmer or Rancher	6
22	Career Government Official	0
24	Journalist or Communications Executive	4
2	Physician	0
1	Veterinarian	1
0	Geologist	2
6	Worker or Skilled Tradesperson	0
25	Other	3

Ethnic Group

17	Black American	1
2	Asian American	3
4	Hispanic American	0

21. In the Senate, if 25 male members were replaced by 25 female members, the ratio of male members to female members would be _____ .

(A) 4 to 1
(B) 3 to 1
(C) 3 to 2
(D) 2 to 1
(E) 1 to 1

22. Approximately what percent of the members of Congress are lawyers?

(A) 63%
(B) 58%
(C) 56%
(D) 52%
(E) 49%

23. If 5 senators are Catholic Democrats, how many senators are neither Catholic nor Democratic?

(A) 79
(B) 74
(C) 69
(D) 31
(E) 21

24. If all lawyers and all women in the House of Representatives vote for the passage of a bill, how many more votes will be needed for a majority?

(A) 435
(B) 220
(C) 3
(D) 0
(E) It cannot be determined from the information given.

25. Which of the following can be inferred from the information given in the chart?

I. More than 80 percent of the men in Congress are members of the House of Representatives.
II. The percent of members who are categorized as farmers or ranchers is greater for the House of Representatives than for the Senate.
III. The median age in the Senate is 57.

(A) I only
(B) II only
(C) III only
(D) I and II
(E) I and III

GO ON TO THE NEXT PAGE.

26. If $xy \neq 0$, $\dfrac{x-1}{xy} =$

(A) $\dfrac{1}{x} - \dfrac{1}{xy}$

(B) $\dfrac{x}{y} - \dfrac{1}{xy}$

(C) $\dfrac{1}{y} - x$

(D) $\dfrac{1}{y} - \dfrac{1}{xy}$

(E) $\dfrac{1}{xy} - \dfrac{1}{y}$

27. The number 0.01 is how many times as great as the number $(0.0001)^2$?

(A) 10^2

(B) 10^4

(C) 10^6

(D) 10^8

(E) 10^{10}

28. A certain cake recipe states that the cake should be baked in a pan 8 inches in diameter. If Jules wants to use the recipe to make a cake of the same depth but 12 inches in diameter, by what factor should he multiply the recipe ingredients?

(A) $2\dfrac{1}{2}$

(B) $2\dfrac{1}{4}$

(C) $1\dfrac{1}{2}$

(D) $1\dfrac{4}{9}$

(E) $1\dfrac{1}{3}$

29. If $x > 0$ and $y > 0$, which of the following is equivalent to $\dfrac{x}{y}\sqrt{\dfrac{y}{x^2}}$?

(A) 1

(B) $\dfrac{\sqrt{x}}{\sqrt{y}}$

(C) $\sqrt{x}$

(D) $\dfrac{1}{\sqrt{x}}$

(E) $\dfrac{1}{\sqrt{y}}$

30. The cost, in dollars, of manufacturing x refrigerators is $9{,}000 + 400x$. The amount received when selling these x refrigerators is $500x$ dollars. What is the least number of refrigerators that must be manufactured and sold so that the amount received is at least equal to the manufacturing cost?

(A) 10
(B) 18
(C) 45
(D) 90
(E) 100

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