

SECTION 3

Time — 25 minutes

20 Questions

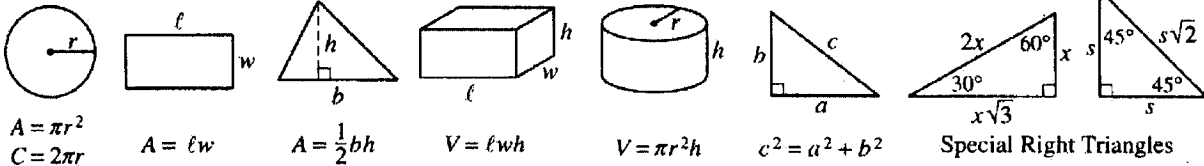
Turn to Section 3 (page 4) of your answer sheet to answer the questions in this section.

Directions: For this section, solve each problem and decide which is the best of the choices given. Fill in the corresponding circle on the answer sheet. You may use any available space for scratchwork.

Notes

- The use of a calculator is permitted.
- All numbers used are real numbers.
- Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
- Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number.

Reference Information



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. If $3b + 1 < 10$, which of the following CANNOT be the value of b ?

- (A) -1
- (B) 0
- (C) 1
- (D) 2
- (E) 3

WORK BACKWARDS
I'LL START WITH 3.
 $3(3) + 1 < 10$; $10 < 10$
FALSE (E)

2. If $2^{4x} = 16$, then $x =$

- (A) 1
- (B) 2
- (C) 4
- (D) 8
- (E) 12

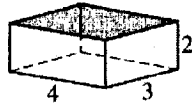
WORK BACKWARDS
 $2^{4(1)} = 16$
 $2^4 = 16$
 $2 \cdot 2 \cdot 2 \cdot 2 = 16$
(A)

3. How much greater than $r - 2$ is $r + 5$?

- (A) 2
- (B) 3
- (C) 5
- (D) 6
- (E) 7

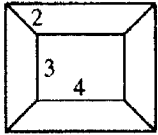
~~R~~
 $(R - 2) + X = R + 5$
 $-R \quad -R$
 $-2 + X = 5$
 $+2 \quad +2$
 $X = 7$
(E)

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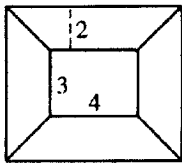


4. If the rectangular box with no lid shown above is cut along the vertical edges and flattened, which of the following figures best represents the result?

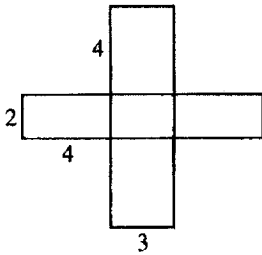
(A)



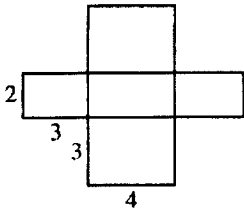
(B)



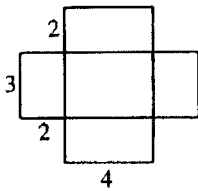
(C)



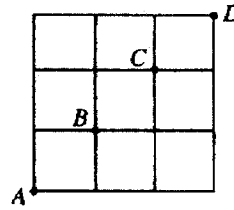
(D)



(E)

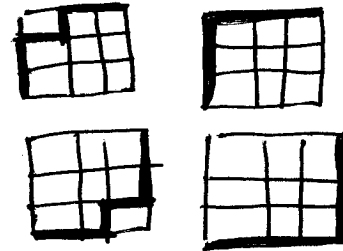


SINCE EVERY VERTICAL EDGE IS 2 ...
(E)



5. In the figure above, a path from point A to point D is determined by moving upward or to the right along the grid lines. How many different paths can be drawn from A to D that do not include either B or C?

- (A) Two
- (B) Four
- (C) Six
- (D) Eight
- (E) Sixteen



(B)

6. If $\frac{3}{7}$ of n is 42, what is $\frac{5}{7}$ of n ?

- (A) 70
- (B) 45
- (C) 30
- (D) 18
- (E) 10

$$\frac{3}{7} \cdot n = 42$$

$$\frac{3n}{7} = 42$$

$$7 \cdot \frac{3n}{7} = 42 \cdot 7$$

$$3n = 294$$

$$n = 98$$

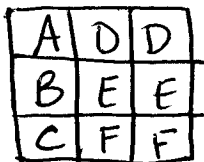
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$$\frac{5}{7} \cdot \overset{14}{\cancel{98}} = 70 \quad (A)$$

| | |
|---|---|
| A | D |
| B | E |
| C | F |

7. The figure above shows the top view of an open square box that is divided into 6 compartments with walls of equal height. Each of the rectangles D , E , and F has twice the area of each of the equal squares A , B , and C . When a marble is dropped into the box at random, it falls into one of the compartments. What is the probability that it will fall into compartment F ?

- (A) $\frac{1}{12}$
 (B) $\frac{1}{8}$
 (C) $\frac{1}{6}$
 (D) $\frac{2}{11}$
 (E) $\frac{2}{9}$



(E)

8. If a and b are odd integers, which of the following must also be an odd integer?

- I. $(a + 1)b$
 II. $(a + 1) + b$
 III. $(a + 1) - b$

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

$a = 3 \quad b = 5$

I. $(3+1)5 = 20$
FALSE

II. $(3+1)+5 = 9$
TRUE

III. $(3+1)-5 = -1$
TRUE

(E)

5.101001000100001...

9. The decimal number above consists of only 1's and 0's to the right of the decimal point. The first 1 is followed by one 0, the second 1 is followed by two 0's, the third 1 is followed by three 0's, and so on. What is the total number of 0's between the 98th and the 101st 1 in this decimal number?

- (A) 288
 (B) 291
 (C) 294
 (D) 297
 (E) 300

BETWEEN THE 1ST AND 2ND 1

THERE IS 1 ZERO.

BETWEEN THE 2ND AND 3RD,

THERE ARE 2. BETWEEN THE 3RD AND 4TH,

THERE ARE 3. SO...

BETWEEN 98 AND 99 THERE ARE 98,

THEN 99, THEN 100.

$$98 + 99 + 100 = 297 \quad (D)$$

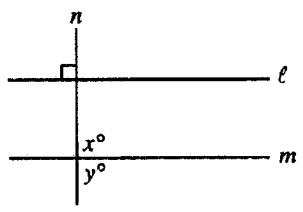
10. If $f(x) = \frac{3-2x^2}{x}$ for all nonzero x , then $f(2) =$

- (A) $\frac{11}{2}$
 (B) $\frac{7}{2}$
 (C) $-\frac{1}{2}$
 (D) $-\frac{5}{2}$
 (E) -7

$$\begin{aligned} f(2) &= \frac{3-2(2)^2}{2} \\ &= \frac{3-2(4)}{2} \\ &= \frac{3-8}{2} \\ &= -\frac{5}{2} \end{aligned} \quad (D)$$


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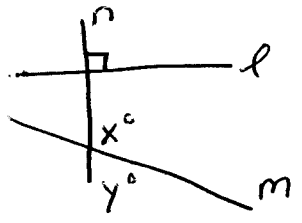


Note: Figure not drawn to scale.

11. In the figure above, $l \perp n$ and $x > 90$. Which of the following must be true?

- (A) $y < 90$
- (B) $y > 90$
- (C) $y = 90$
- (D) $n \perp m$
- (E) $l \parallel m$

IT DOES NOT SAY
 $l \parallel m$ OR
 $m \perp n$. REDRAW



$x + y = 180^\circ$
 $x > 90^\circ$
 $y < 90^\circ$ (A)

12. In the xy -plane, the line with equation $y = 5x - 10$ crosses the x -axis at the point with coordinates (a, b) . What is the value of a ?

- (A) -10
- (B) -2
- (C) 0
- (D) 2
- (E) 5

OF COURSE, WHEN
 A LINE CROSSES
 THE X-AXIS AT
 (a, b) , b ALWAYS
 MUST BE ZERO.

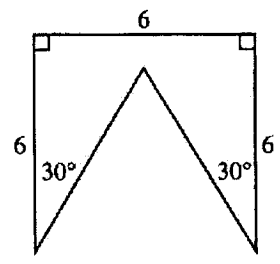
$0 = 5x - 10$
 $10 = 5x$
 $2 = x$ (D)

| City | Noon Temperature (degrees Fahrenheit) |
|------|---------------------------------------|
| A | 50° |
| B | 33° |
| C | 27° |
| D | t° |
| E | 68° |
| F | 44° |
| G | 40° |

13. The table above shows the noon temperatures for seven cities designated A through G. If the median noon temperature of these cities is 40°F, then the noon temperature for City D could be any of the following EXCEPT

- (A) 29°F
- (B) 35°F
- (C) 39°F
- (D) 40°F
- (E) 42°F

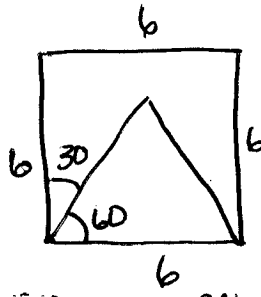
FOR MEDIAN, ELEMENTS MUST BE IN ORDER:
 27 30 40 44 50 68
 ^ ^ ^ ^
 29 35 39 40 42
 OK OK OK OK NO! (E)



14. What is the perimeter of the figure above?

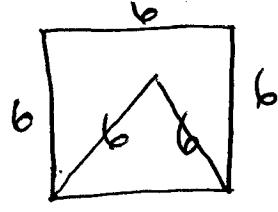
- (A) 24
- (B) 25
- (C) 28
- (D) 30
- (E) 36

CLOSE THE BOX:



THE TRIANGLE IS EQUILATERAL.
 SO ALL SIDES = 6

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(D)

15. If m is the greatest prime factor of 38 and n is the greatest prime factor of 100, what is the value of $m + n$?

- (A) 7
- (B) 12
- (C) 24
- (D) 29
- (E) 44

FACTORS OF 38:
GREATEST IS 19. IT IS PRIME.

FACTORS OF 100:

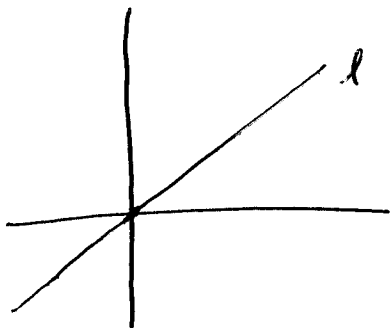
- 50 - NOT PRIME
- 25 - NOT PRIME
- 20 - NOT PRIME
- 10 - NOT PRIME
- 5 - PRIME

$19 + 5 = 24$ (C)

16. Line l has a positive slope and passes through the point $(0, 0)$. If line k is perpendicular to line l , which of the following must be true?

- (A) Line k passes through the point $(0, 0)$.
- (B) Line k has a positive slope.
- (C) Line k has a negative slope.
- (D) Line k has a positive x -intercept.
- (E) Line k has a negative y -intercept.

DRAW.



- (A) CAN YOU DRAW k NOT THROUGH $(0,0)$? YES (A)
- (B) CAN YOU DRAW k NOT WITH A POSITIVE SLOPE? YES (B)
- (C) MUST BE NEGATIVE. (C)

17. Let the operation \hat{u} be defined by $a \hat{u} b = \frac{a+b}{a-b}$

for all numbers a and b , where $a \neq b$.

If $1 \hat{u} 2 = 2 \hat{u} x$, what is the value of x ?

- (A) 4
- (B) 3
- (C) 2
- (D) 1
- (E) 0

$1 \hat{u} 2 = \frac{1+2}{1-2} = \frac{3}{-1} = -3$

$-3 = 2 \hat{u} x = \frac{2+x}{2-x}$

MULTIPLY BY $(2-x)$:

$-3(2-x) = \frac{2+x}{2-x} (2-x)$

$-6 + 3x = 2 + x; 2x = 8; x = 4$ (A)

18. During a sale, a customer can buy one shirt for x dollars. Each additional shirt the customer buys costs z dollars less than the first shirt. For example, the cost of the second shirt is $x - z$ dollars. Which of the following represents the customer's cost, in dollars, for n shirts bought during this sale?

- (A) $x + (n - 1)(x - z)$
- (B) $x + n(x - z)$
- (C) $n(x - z)$
- (D) $\frac{x + (x - z)}{n}$
- (E) $(x - z) + \frac{(x - z)}{n}$

PLUG IN NUMBERS

$x = 5$

$z = 2$

$n = 4$

FOR 4 SHIRTS,

THE TOTAL COST IS $5 + 3 + 3 + 3$,

\$14.

(A) $5 + (4-1)(5-2) = 5 + (3)(3) = 14$

~~(B)~~ $5 + 4(5-2) = 5 + 4(3) = 17$

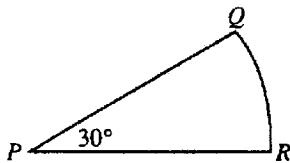
~~(C)~~ $4(5-2) = 4(3) = 12$

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~~(D)~~ $\frac{5 + (5-2)}{4} = \frac{5+3}{4} = 2$

~~(E)~~ $(5-2) + \frac{(5-2)}{4} = 3 + \frac{3}{4}$

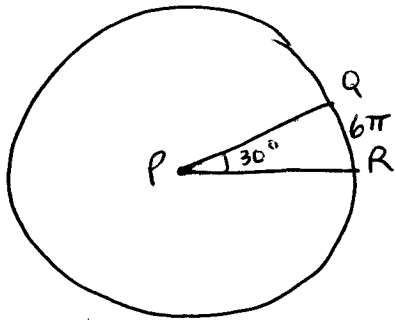
(A)



19. In the figure above, QR is the arc of a circle with center P . If the length of arc QR is 6π , what is the area of sector PQR ?

- (A) 108π
 (B) 72π
 (C) 54π
 (D) 36π
 (E) 9π

DRAW CIRCLE:



IF 30° IS ARC LENGTH 6π ,
 HOW LARGE IS THE CIRCUMFERENCE?

$360^\circ = \underline{12} \times 30^\circ$, SO THE
 CIRCUMFERENCE IS 72π .

CIRCUM = $2\pi R$, SO $R = 36$.

THE AREA OF THE CIRCLE IS
 πR^2 , OR $\pi 36 \cdot 36$.

DIVIDE $36 \cdot 36 \pi$ TO GET
 THE AREA OF THE SECTOR:

$$\frac{3 \cdot 36 \cdot 36 \pi}{12} = 108\pi \quad (A)$$

20. There are 75 more women than men enrolled in Linden College. If there are n men enrolled, then, in terms of n , what percent of those enrolled are men?

(A) $\frac{n}{n+75}\%$

(B) $\frac{n}{2n+75}\%$

(C) $\frac{n}{100(2n+75)}\%$

(D) $\frac{100n}{n+75}\%$

(E) $\frac{100n}{2n+75}\%$

PLUG IN NUMBERS.

$n = 25$ MEN

THERE ARE 100
 WOMEN.

THERE ARE 125 PEOPLE.

THE PERCENTAGE OF MEN

IS $\frac{25}{125} \times 100$ OR 20%

~~(A)~~ $\frac{25}{25+75} = \frac{25}{100}\%$

~~(B)~~ $\frac{25}{50+75} = \frac{25}{125}\%$

~~(C)~~ $\frac{25}{100(50+75)} = \frac{25}{12500}\%$

~~(D)~~ $\frac{25(100)}{25+75} = \frac{2500}{100} = 25\%$

(E) $\frac{25(100)}{50+75} = \frac{2500}{125} = 20\%$

(E)

STOP

If you finish before time is called, you may check your work on this section only.
 Do not turn to any other section in the test.