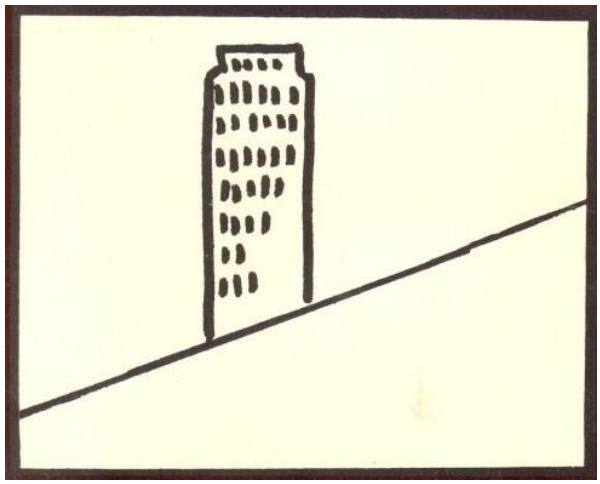
A Droodle for the S.A.T. Math Exam without a calculator

A puzzle by David Pleacher



"A Droodle is a borkley looking sort of drawing that doesn't make any sense until you know the correct title." – Roger Price

Caption for the picture:

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

24 15 11 14 7 23 10 16 1 25 18 6 22 25 5 14 2 9 13

__ __ __ __ __ __ __ __ __ __ __ __ __ __ __

17 5 20 21 1 19 3 24 23 12 7 1 8 4

To determine the title to this droodle, solve the 25 math problems which are similar to problems found on the S.A.T. math section.
Then find the answers to each problem from the choices listed.
Replace the numbered blank with the letter corresponding to the answer for that problem.
A calculator should not be used on this part of the exam.

___ 1. If $3r = 18$, what is the value of $6r + 3$?

F. 6
O. 27
C. 36
I. 39

___ 2. Which of the following is equal to $a^{\frac{2}{3}}$, for all values of *a* ?

C. $\sqrt{a^{\frac{1}{3}}}$

O. $\sqrt{a^{3}}$

N. $\sqrt[3]{a^{2}}$

E. $\sqrt[3]{a^{\frac{1}{2}}}$

___ 3. Given the system of equations $\begin{cases} 3x-2y=-6 \\ 2x-3y=-14 \end{cases}$.

If (x, y) is a solution of the system, what is the value of $x-y$?

G. -4

R. -8

I. 2

D. 8

___ 4. The function f is defined by a polynomial. Some values of x and $f(x)$ are shown in the table below. Which of the following must be a factor of $f(x)$?

x	$f(x)$
0	3
2	1
4	0
5	-2

M. $x-2$

A. $x-3$

T. $x-4$

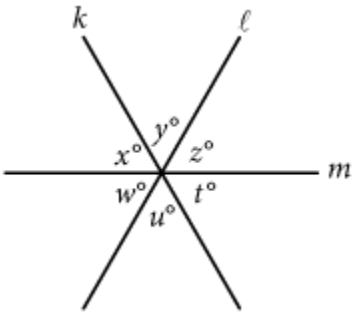
H. $x-5$

___ 5. The parabola with equation $y=(x-11)^2$ intersects the line with equation $y=25$ at two points, *A* and *B*. What is the length of $\overline{AB}$?

E. 10
X. 12
A. 14
M. 16

___ 6. In the diagram below, lines *k*, *l*, and *m* intersect at a point. If $x+y=u+w$, which of the following must be true?

I. x = z
II. y = w
III z = t



F. I and II only
A. I and III only
C. II and III only
E. I. II, and III

___ 7. The equation $\frac{24x^2+25x-47}{ax-2}=-8x-3-\frac{53}{ax-2}$ is true for all values of $x\neq\frac{2}{a}$, where *a* is a constant. What is the value of *a* ?

T. -16
R. -3
I. 3
G. 16

___ 8. The equation $C = \frac{5}{9}(F - 32)$ shows how a temperature *F*, measured in degrees Fahrenheit, relates to a temperature *C*, measured in degrees Celsius. Based on the equation, which of the following must be true?

I. A temperature increase of 1 degree Fahrenheit is equivalent to a temperature increase of $\frac{5}{9}$ degree Celsius.

II. A temperature increase of 1 degree Celsius is equivalent to a temperature increase of 1.8 degrees Fahrenheit.

III. A temperature increase of $\frac{5}{9}$ degree Fahrenheit is equivalent to a temperature increase of 1 degree Celsius.

R. I only
A. II only
Y. III only
S. I and II only

___ 9. What is the sum of the complex numbers $2+3i$ and $4+8i$?

C. 17
U. 17*i*
B. 6 + 11*i*
E. 8 + 24*i*

___ 10. In the equation $4x^2 - 9 = (ax + m)(ax - m)$, *a* and *m* are constants. Which of the following could be the value of *a* ?

F. 2
A. 3
C. 4
D. 9

___ 11. If $\sqrt{x} + \sqrt{9} = \sqrt{64}$, what is the value of *x* ?

R. $\sqrt{5}$
O. 5
W. 25
S. 55

___ 12. In the equation $2x^2 - 4x = k$, k is a constant. If the equation has no real solutions, Which of the following could be the value of k ?

U. -3
N. -1
I. 1
T. 3

___ 13. A laundry service is buying detergent and fabric softener from its supplier. The supplier will deliver no more than 300 pounds in a shipment.

Each container of detergent weighs 7.35 pounds, and each container of fabric softener weighs 6.2 pounds.

The service wants to buy at least twice as many containers of detergent as containers of fabric softener.

Let d represent the number of containers of detergent, and let s represent the number of containers of fabric softener, where d and s are nonnegative integers.

Which of the following systems of inequalities best represents this situation?

Y. $7.35d + 6.2s \le 300$
$d \ge 2s$

A. $7.35d + 6.2s \le 300$
$2d \ge s$

R. $14.7d + 6.2s \le 300$
$d \ge 2s$

D. $14.7d + 6.2s \le 300$
$2d \ge s$

___ 14. Which of the following is equivalent to $\left(a+\frac{b}{2}\right)^2$?

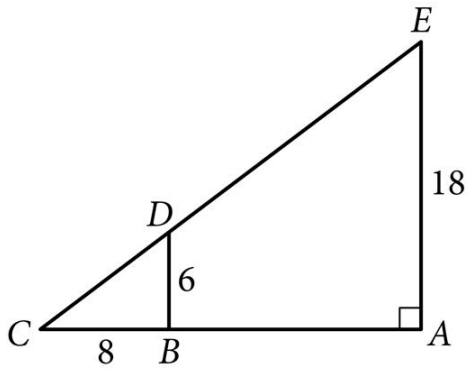
M. $a^2+\frac{b^2}{2}$

O. $a^2+\frac{b^2}{4}$

D. $a^2+\frac{ab}{2}+\frac{b^2}{2}$

E. $a^2+ab+\frac{b^2}{4}$

___ 15. In the figure below, $\overline{BD}$ is parallel to $\overline{AE}$. What is the length of $\overline{CE}$?



P. 20

L. 24

O. 30

T. 36

___ 16. How many liters of a 25% saline solution must be added to 3 liters of a 10% saline solution to obtain a 15% saline solution?

A. 1

P. 1.5

E. 2.5

X. 3

___ 17. Points *A* and *B* lie on a circle with radius 1, and arc AB has length $\frac{\pi}{3}$. What fraction of the circumference of the circle is the length of arc AB ?

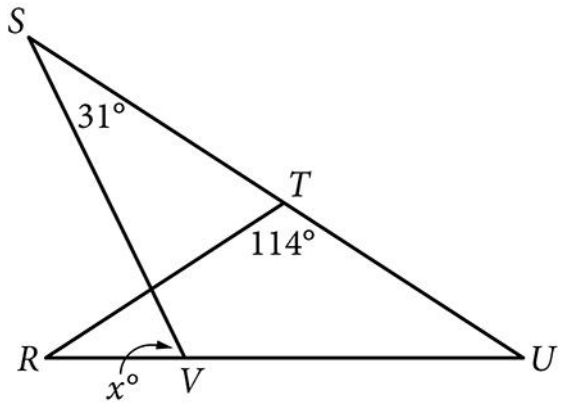
P. $\frac{1}{4}$

L. $\frac{1}{6}$

U. $\frac{1}{3}$

S. $\frac{2}{3}$

___ 18. In the figure below, $RT = TU$. What is the value of *x* ?



B. 66

A. 64

S. 58

E. 56

___ 19. The width of a rectangular dance floor is w feet. The length of the floor is 6 feet longer than its width. Which of the following expresses the perimeter, in feet, of the dance floor in terms of w ?

O. $2w+6$

N. $4w+12$

C. w^2+6

E. w^2+6w

___ 20. Which of the following expressions is equivalent to $\frac{f(x)}{g(x)}$ for $x>3$, where $f(x)=x^3-9x$ and $g(x)=x^2-2x-3$?

D. $\frac{1}{x+1}$

E. $\frac{x+3}{x+1}$

C. $\frac{x(x-3)}{x+1}$

A. $\frac{x(x+3)}{x+1}$

___ 21. The graph of $(x-6)^2+(y+5)^2=16$ is a circle. Point *P* is on the circle and has coordinates $(10,-5)$. If $\overline{PQ}$ is a diameter of the circle, what are the coordinates of point *Q*?

N. $(2,-5)$

O. $(6,-1)$

R. $(6,-5)$

M. $(6,-9)$

___ 22. If $u+t=5$ and $u-t=2$, what is the value of $(u-t)(u^2-t^2)$?

B. 2

A. 10

S. 20

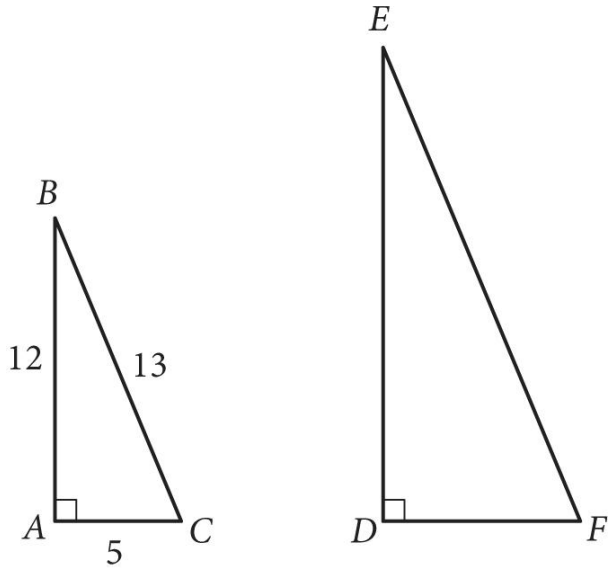
E. 50

___ 23. In the system of equations below, a is a constant. For which of the following values of a does the system have no solution?

$$\begin{cases} -3x + y = 6 \\ ax + 2y = 4 \end{cases}$$

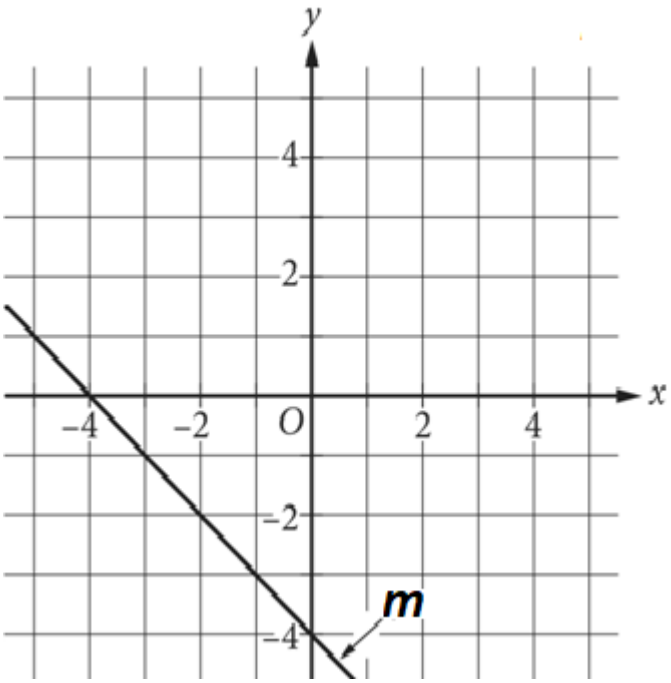
R. -3
O. -6
W. 3
S. 6

___ 24. In the figure below $\triangle ABC$ is similar to $\triangle DEF$. What is the value of $\cos(E)$?



K. $\frac{5}{12}$
N. $\frac{5}{13}$
O. $\frac{12}{5}$
T. $\frac{12}{13}$

___ 25. Which of the following is an equation of line ***m*** in the figure below ?



C. $x-y=-4$

U. $x-y=4$

S. $x+y=-4$

P. $x+y=4$

The droodle used in this puzzle was drawn by Roger Price and appeared in his book called *Droodles.*