



MATHS

BOOKS - KAPLAN INC MATHS (ENGLISH)

LINEAR EQUATIONS AND GRAPHS

How Much Do You Know

1. Uniform circular motion is used in physics to describe the motion of an object traveling at a

constant speed in a circle. The speed of the object is called tangential velocity and it can be calculated using the formula above, where r is the radius of the circle and T is the time it takes for the object to make one complete circle, called a period. Which of the following formulas could be used to find the length of one period if you know the tangential velocity and the radius of the circle ?

A. $T = \frac{v}{2\pi r}$

B. $T = \frac{2\pi r}{v}$

C. $T = 2\pi r v$

$$D. T = \frac{1}{2\pi r v}$$

Answer: B



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2. The formula above is Newton's law of universal gravitation, where F is the attractive force, γ is the gravitational constant, m_1 and m_2 are the masses of the particles, and r is the distance between their centres of

mass. Which of the following gives r in terms of F , γ , m_1 , and m_2 ?

A. $r = \sqrt{\frac{(m_1)(m_2)}{\gamma(m_2)}}$

B. $r = \sqrt{\frac{F(m_2)}{\gamma(m_1)}}$

C. $r = \sqrt{\frac{\gamma(m_2)}{F(m_1)}}$

D. $r = \sqrt{\frac{\gamma(m_1)(m_2)}{F}}$

Answer: D



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3. Andrew works at a travel agency. He gets paid \$120 for a day's work, plus a bonus of \$25 for each cruise he books. Which of the following equations represents the relationship between the total Andrew earns in a day, d , and the number of cruises he books, c ?

A. $c = 26d + 120$

B. $c = 120d + 25$

C. $d = 120 + 25c$

$$D. d = 120c + 25$$

Answer: C



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4. Vera is on her school's track and field team. In a particular long-jump competition against her teammates, she gets 5 points for landing over the nearer line and 10 points for landing over the more distant line. She gets a total of 7 jumps and lands x times over the more distant

line and the rest of the times over the nearer line. Which of the following equations represents the relationship between Vara's total score, y , and the number of times she lands over the more distant line, x ?

A. $y = 10x$

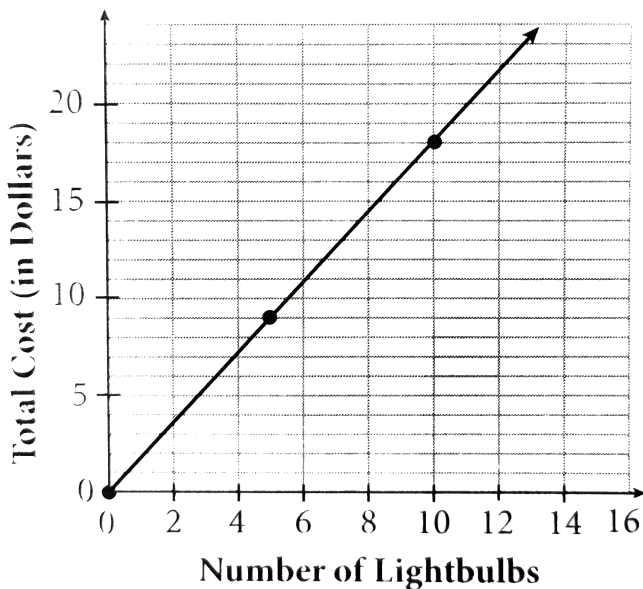
B. $y = 5x + 35$

C. $y = 10x + 5$

D. $y = 70 - 5x$

Answer: B





5.

A hardware store sells light bulbs in different quantities. The graph shows the cost of various quantities. According to the graph, what is the cost of a single light bulb ?

A. \$0.56

B. \$1.80

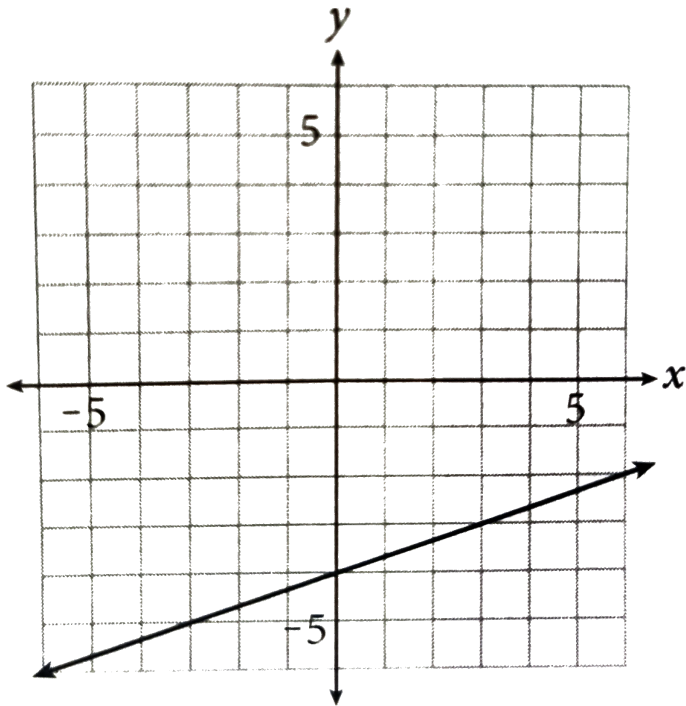
C. \$2.50

D. \$3.60

Answer: B



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6.

The graph shown represents which of the following equations ?

A. $y = -3x + 4$

B. $y = -\frac{1}{3}x + 4$

C. $y = \frac{1}{3}x - 4$

D. $y = 3x - 4$

Answer: C



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Try Your Own

1. $3y + 2(y - 2) = \frac{3y}{2} + 1$

What value of y satisfies the equation above ?

A. $-\frac{10}{7}$

B. $-\frac{6}{13}$

C. $\frac{7}{9}$

D. $\frac{10}{7}$

Answer: D



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$$2. S = \frac{C - \frac{1}{4}I}{C + I}$$

A teacher uses the formula above to calculate

her students' scores, S , by subtracting $\frac{1}{4}$ of the number of equations the students answered incorrectly, I , from the number of questions they answered correctly, C , and dividing by the total number of questions. Which of the following expresses the number of questions answered incorrectly in terms of the other variables ?

A. $\frac{C(1 - 4S)}{4S + 1}$

B. $\frac{C(1 + 4S)}{4S - 1}$

C. $\frac{4C(1 - S)}{4S + 1}$

D. $\frac{4C(1 + S)}{4S - 1}$

Answer: C



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3. What value of n satisfies the equation

$$\frac{7}{8}(n - 6) = \frac{21}{2} ?$$



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4. If $b \neq 0$ and $\frac{3a + b}{b} = \frac{11}{2}$, which of the following could be the value of $\frac{a}{b}$?

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

B. $\frac{7}{2}$

C. $\frac{9}{2}$

D. It is not possible to determine a value of $\frac{a}{b}$.

Answer: A



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$$5. \frac{4 + z - (3 + 2z)}{6} = \frac{-z - 3(5 - 2)}{7}$$

What is the value of z in the equation above ?

A. -61

B. $-\frac{61}{27}$

C. $\frac{61}{27}$

D. 61

Answer: D



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6. A local restaurant is hosting a dance-a-thon for charity. Each couple must dance a minimum of three hours before earning any money for the charity. After the first three hours, couples earn \$50 per half-hour of continuous dancing. Which expression represents the total amount earned by a couple who dance h hours, assuming they dance at least three hours ?

A. $25h$

B. $100h$

C. $50(h - 3)$

D. $100h - 300$

Answer: D



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7. The final value, v , in a four-digit lock code is determined by multiplying the second value by two, subtracting that expression from the first value, and dividing the resulting expression by half of the third value. The first value is f , the

second value is 1, and the third value is t . What is the final value, v , in terms of f and t ?

A. $\frac{f - 2}{t}$

B. $\frac{2f - 4}{t}$

C. $\frac{t}{2f - 4}$

D. $\frac{2t - 4}{f}$

Answer: B



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8. A pizzeria's top-selling pizzas are The Works and The Hawaiian. The Works sells for \$17, and The Hawaiian sells for \$13. Ingredient costs for the works are \$450 per week, and ingredient costs for The Hawaiian are \$310 per week. If x represents the number of each type of pizza sold in one week, and the weekly profit from the sale of each type of pizza is the same, what is the values of x ?

A. 30

B. 35

C. 140

D. 145

Answer: B



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9. A student opens a checking account when she starts a new job so that her paychecks can be directly deposited into the account. Her balance can be computed using the expression $10nw + 50m$ where n is the

number of hours she works every week and w is the number of weeks that she has worked so far. Assuming she does not withdraw any money from her account, which of the terms in the expression most logically will change if the student gets a raise ?

A. 10

B. n

C. w

D. The expression will not change if the student gets a raise.

Answer: A



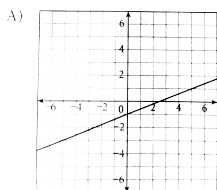
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10. Milk starts a job at which his starting salary is \$25,500 per year. He expects that his salary will increase by a constant dollar amount annually. In 12 years, his salary will be double his starting salary. Assuming salary increases take place only at the end of a full year, how many years must Malik wait until his salary is at least \$40,000 annually?

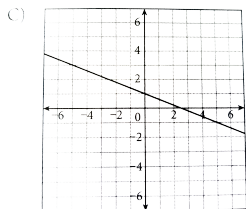


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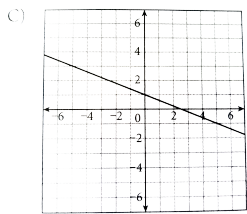
11. Line A passes through the coordinate points $\left(-\frac{2}{5}, 0\right)$ and $(0, 1)$. Which of the following lines will line A never intersect ?



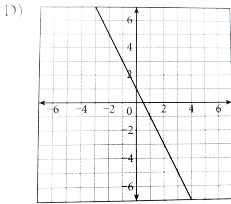
A.



B.



C.



D.

Answer: B



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12. In the xy -plane, the point $(4, 7)$ lies on the line t , which is perpendicular to the line

$y = -\frac{4}{3}x + 6$. What is the equation of line t ?

A. $y = \frac{3}{4}x + 4$

B. $y = -\frac{4}{3}x + 4$

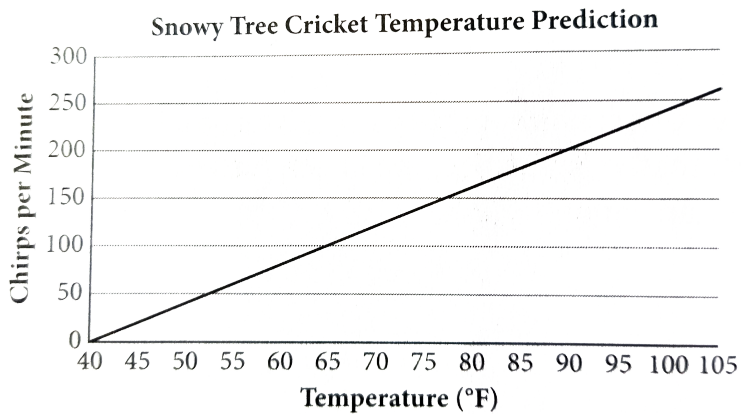
C. $y = \frac{3}{4}x + 7$

D. $y = -\frac{3}{4}x + 4$

Answer: A



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13.

The graph shows the correlation between ambient air temperature, t , in degrees Fahrenheit and the number of chirps, c , per minute that a snowy tree cricket makes at that temperature. Which of the following equations represents the line shown in the graph ?

A. $c = 4t - 160$

B. $c = \frac{1}{4}t - 160$

C. $c = \frac{1}{2}t - 40$

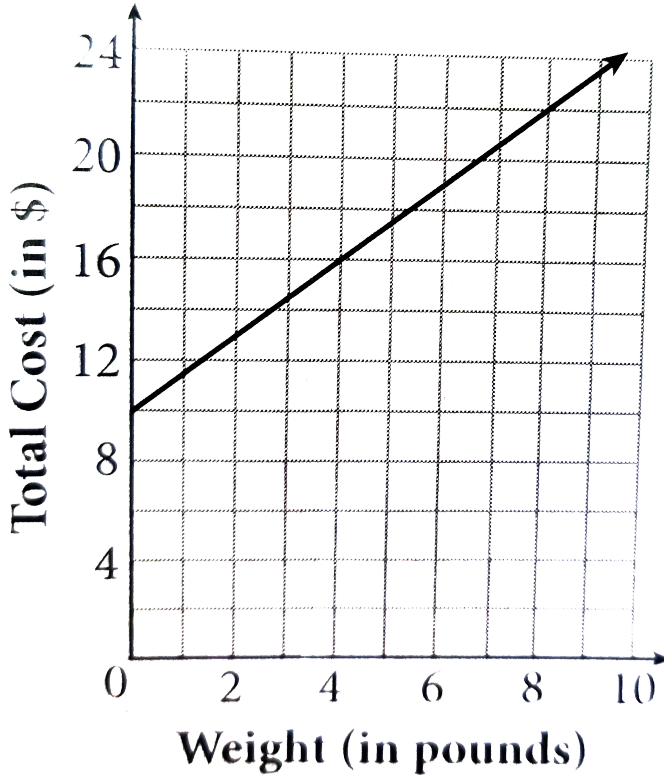
D. $c = 4t + 160$

Answer: A



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Box Airmail



14.

A freight airline charges a flat fee to airmail a box, plus an additional charge for each pound the box weighs. The graph above shows the relationship between the weight of the box

and the total cost to airmail it. Based on the graph, how much would it cost in dollars to airmail a 40-pound box



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15.

Minutes Charging	10	15	30
Percent Charged	34	41.5	64

Xia is charging her laptop. She records the battery charge for the first 30 minutes after she plugs it in to get an idea of when it will be completely charged. The table above shows the results. If y is the percent battery charge

on Xia's laptop, which linear equation represents the correct relationship between y and x ?

A. $y = 1.5x + 19$

B. $y = 2x + 14$

C. $y = 2.5x + 9$

D. $y = 10x + 34$

Answer: A



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16. Remember that the SAT doesn't ask you to show your work. If you find the algebra in a question challenging, there is often another way to get to the answer. Try this question first using algebra and then using the picking numbers strategy you learned in chapter 3. Time yourself. Which approach do you find easier? Which one was faster? Did you get the correct answer both times? Remember your preferred approach and try it first if you see a question like this on test day.

$$\frac{2(a - 3)}{b} = \frac{4}{7}$$

If the equation above is true, which of the following must NOT be true ?

A. $\frac{b}{a-3} = \frac{7}{2}$

B. $\frac{2a}{b} = -\frac{10}{7}$

C. $14a - 4b = 42$

D. $\frac{a-3}{b} = \frac{2}{7}$

Answer: B



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17. Which value of x makes the equation

$$\frac{8}{5} \left(x + \frac{33}{12} \right) = 16 \text{ true?}$$

A. 7.25

B. 8.75

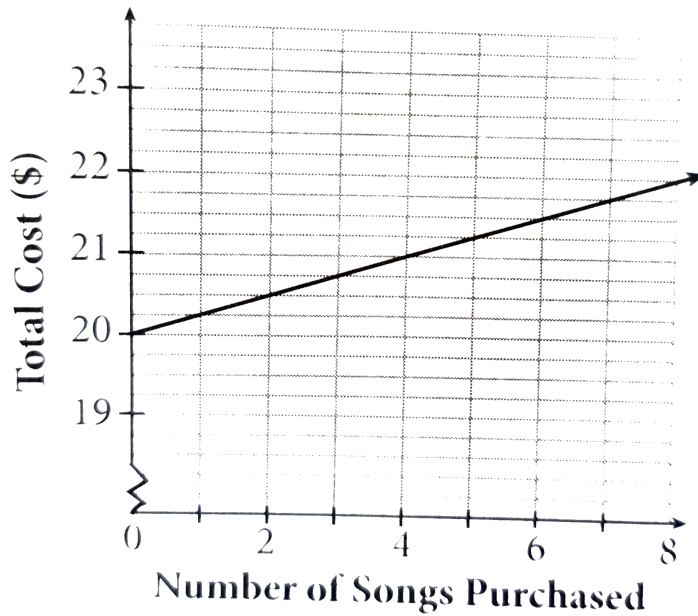
C. 12.75

D. 13.25

Answer: A



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18.

The graph above shows the cost of joining and buying music from a music subscription service.

What does the y-intercept of the line most likely represent ?

A. The cost per song

B. The cost to join the service

C. The cost of buying 20 sings

D. The cost of 20 subscriptions to the
service

Answer: B



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19. If $\frac{3}{4}y = 6 - \frac{1}{3}c$, then what is the value of
 $2x + \frac{9}{2}y$?



20. Three years ago, Madison High School started charging an admission fee for basketball games to raise money for new bleachers. The initial price was \$2 per person, the school raised the price of admission to \$2.50 this year. Assuming this trend continues, which of the following equations can be used to describe c , the cost of admission, y years after the school began charging for admission to games ?

A. $c = 6y + 2$

B. $c = \frac{y}{6} + 2.5$

C. $c = \frac{y}{6} + 2$

D. $c = \frac{y}{2} + 2$

Answer: C



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Price of One Pound	Projected Number of Pounds Sold
\$1.20	15,000
\$1.40	12,500
\$1.60	10,000
\$1.80	7,500
\$2.00	5,000
\$2.20	2,500

21.

Which of the following equations best, describes the linear relationship shown in the table, where g represents the number of pounds of grain sold and d represents the price in dollars of one pound of grain ?

A. $g = 1.2d + 12.500$

B. $g = 12,500d + 15,000$

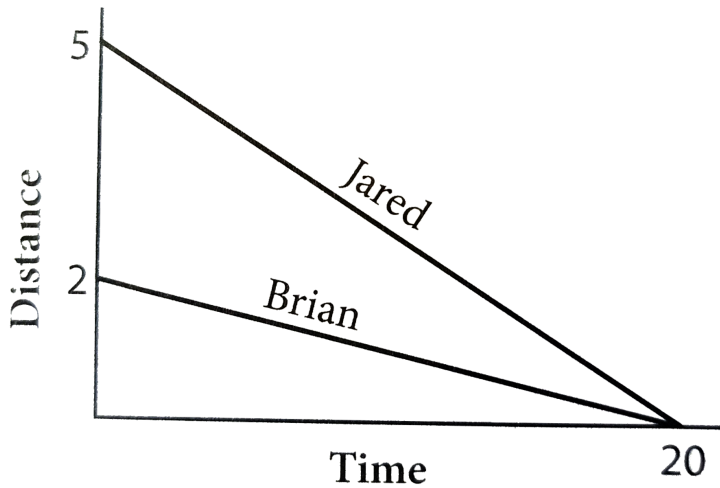
$$C. g = -12,500d + 17,500$$

$$D. g = -12,500d + 30,000$$

Answer: D



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22.

Brain and Jared live in the same apartment complex and both bike to and from work every day. The figure above shows a typical commute home for each of them. Based on the figure, which of the following statements is true ?

A. It takes Brain longer to bike home because his work is farther away.

B. It takes Jared longer to bike home because his work is farther away.

C. Jared and Brain arrive home at the same time, so they must bike at about the same rate.

D. Jared bikes a longer distance than Brain in the same amount of time, so Jared must bike at a faster rate.

Answer: D



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23. When graphing a linear equation that is written in the form $y = mx + b$, the variable m represents the slope of the line and b represents the y -intercept. Assuming that $b > 0$, which of the following best describes how reversing the sign of b will affect the graph ?

A. The new line will be shifted down b units.

B. The new line will be shifted down $2b$ units.

C. the new line will be perfect reflection across the x -axis.

D. The new line will be a perfect reflection across the y -axis.

Answer: B



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24. The graph of a line in the xy -plane passes through the points $(5, 4)$ and $\left(3, \frac{1}{2}\right)$.

Which of the following equations describes the line ?

A. $y = \frac{7}{4}x + \frac{19}{4}$

B. $y = -\frac{7}{4}x - \frac{19}{4}$

C. $y = \frac{7}{4}x - \frac{19}{4}$

D. $y = \frac{4}{6}x + \frac{8}{7}$

Answer: C



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25. Line f in the xy -plane passes through the origin and has a slope of $-\frac{2}{5}$. Line z is perpendicular to line f and passes through the point $(6, 2)$. Which of the following is the equation of line z ?

A. $y = -\frac{1}{5}x$

B. $y = -\frac{2}{5}x - 13$

$$\text{C. } y = \frac{5}{2}x$$

$$\text{D. } y = \frac{5}{2}x - 13$$

Answer: D



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$$26. V = \frac{1}{3}\pi\left(\frac{d}{2}\right)^2 h$$

A circle of rubber with a constant diameter d is placed on a table, its perimeter is anchored to the table and a string is attached to its centre. When the string is pulled upwards, a

cone is formed with height h and volume V .

The relationship between d , h , and V is represented above. Which of the following statements must be true ?

I. As the volume of the cone decreases, the height also decreases.

II. If the diameter of the base of the cone is 6 centimeters, the height can be determined by dividing the volume by 3π .

III. If the height of the cone triples, the volume must also triple.

A. I only

B. I and II only

C. II and III only

D. I, II, and III

Answer: D



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Solving Equations

$$1. \frac{1}{2}(3X + 14) = \frac{1}{6}(7X - 10)$$

Which value of x satisfies the equation above ?

A. -26

B. 2

C. 8

D. 16

Answer: A



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Word Problems

1. A laser tag area sells two types of memberships. One package costs \$325 for one year of membership with an unlimited number of visits. The second package has a \$125 enrollment fee, includes five free visits, and costs an additional \$8 per visit after the first five. How many visits over a one-year period would a person who purchases the second package need to use for the cost to equal that of the one-year membership?

A. 20

B. 25

C. 30

D. 40

Answer: C



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Linear Graph

1. What is the equation of the line that passes through the points $(-3, 1)$ and $(1, 3)$?

A. $y = -x + 2$

B. $y = -x - 2$

C. $y = x - 2$

D. $y = x + 2$

Answer: D



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