Algebra 1 Benchmark 2

1. What is the simplified form of $\frac{32a^2b^2}{(8a^2b^2)^2}$?

Ⓐ $2a^2b^2$

Ⓑ $\frac{a^2b^2}{2}$

Ⓒ $\frac{1}{2a^2b^2}$

Ⓓ $\frac{1}{2ab^2}$

2. The lengths of the sides of triangle PQR are consecutive even integers. The perimeter of triangle PQR is 42 cm. What is the length of the longest side?

Ⓐ 12 cm

Ⓑ 14 cm

Ⓒ 15 cm

Ⓓ 16 cm

3. The formula for calculating the amount of money (A) in an account after t years is $A = P(1 + r)^t$, where P is the initial value and r is the annual interest rate as a decimal. An initial deposit of $200 was made into an account earning 3.5% interest. What will be the balance after 4 years?

Ⓐ $229.50

Ⓑ $350.06

Ⓒ $4,117.23

Ⓓ $82,012.50

4. Andrew opened a savings account with $800. The account has an annual interest rate of 2%. ***Approximately*** how much money will be in Andrew's account at the end of the fourth year?

Ⓐ $816.00

Ⓑ $848.97

Ⓒ $864.00

Ⓓ $865.95

5. The area of a circle varies directly with the square of its radius. A circle with radius 5 has an area of approximately 78.5. What is the approximate area of a circle with radius 10?

Ⓐ 83.5

Ⓑ 94.2

Ⓒ 157

Ⓓ 314

6. The formula $C = \left(\frac{DA}{A + 12}\right)$ can be used to determine the dose of medication for a child. The formula relates a child's age, A, in years and an adult dose, D, of medication to the correct child's dose, C. To the nearest hundredth, what is the correct child's dose for a 5-year-old child when the adult dose is $1\frac{1}{2}$ tablespoons?

Ⓐ 0.38 tablespoons

Ⓑ 0.44 tablespoons

Ⓒ 0.56 tablespoons

Ⓓ 0.63 tablespoons

7. What is the simplest form of $\frac{27x^3y^2}{3x^4y}$?

Ⓐ $\frac{3}{9x^4y^2}$

Ⓑ $9x^7y^2$

Ⓒ $\frac{9y}{x}$

Ⓓ $\frac{9y^2}{x}$

8. There are 16 tablespoons in 1 cup. Kim needs 2 tablespoons of baking powder to make a cake, and she needs to make 6 cakes. How much baking powder should she use?

Ⓐ $\frac{3}{4}$ cup

Ⓑ $1\frac{1}{2}$ cups

Ⓒ 12 cups

Ⓓ 24 cups

9. What is the simplified form of $(2xy^2)^3$?

Ⓐ $8xy^9$

Ⓑ $8xy^6$

Ⓒ $8x^3y^9$

Ⓓ $8x^3y^6$

10. Hooke's law states that the distance a spring stretches is directly proportional to the weight attached to the spring. If a 56-pound weight attached to the spring stretches the spring 7 inches, what is the distance that a 75-pound weight attached to the spring stretches the spring?

Ⓐ $7\frac{5}{8}$ inches

Ⓑ $8\frac{3}{8}$ inches

Ⓒ $9\frac{3}{8}$ inches

Ⓓ $10\frac{5}{8}$ inches

11. What is the simplified form of $(3x^2y^3z)(5x^4y^5z^2)$?

Ⓐ $15x^6y^8z^2$

Ⓑ $15x^6y^8z^3$

Ⓒ $15x^8y^{15}z^2$

Ⓓ $15x^8y^{15}z^3$

12. What is the equation of the line that is parallel to $y = 4x - 3$ and passes through the point $(1, -2)$?

Ⓐ $y = \frac{1}{4}x + 2$

Ⓑ $y = 4x + 2$

Ⓒ $y = \frac{1}{4}x - 6$

Ⓓ $y = 4x - 6$

13. Which is the equation of the line perpendicular to $y = 2x + 1$ through the point $(0, -5)$?

Ⓐ $x - 2y = 10$

Ⓑ $x + 2y = 10$

Ⓒ $x + 2y = -10$

Ⓓ $x - 2y = -10$

14. What is the equation of the line parallel to the line $y = \frac{3}{4}x + 3$ and has a y-intercept of $(0, -3)$?

Ⓐ $3x - 4y = 12$

Ⓑ $3x + 4y = 12$

Ⓒ $3x + 4y = -12$

Ⓓ $3x - 4y = -12$

15. What is the perimeter of the triangle with the vertices $(-1, 1)$, $(-3, -4)$, $(5, -2)$?

Ⓐ $\sqrt{108}$

Ⓑ $\sqrt{142}$

Ⓒ $3\sqrt{3} + 2\sqrt{15} + \sqrt{21}$

Ⓓ $3\sqrt{5} + 2\sqrt{17} + \sqrt{29}$

16. Given points $M(2,5)$, $N(2,3)$, $O(-2,-3)$, and $P(-2,0)$, which are parallel line segments?

Ⓐ $\overline{MP}$ and $\overline{NO}$

Ⓑ $\overline{MN}$ and $\overline{NO}$

Ⓒ $\overline{NP}$ and $\overline{MO}$

Ⓓ $\overline{MN}$ and $\overline{OP}$

17. The coordinates of the vertices of a rectangle are $T(-5,4)$, $U(-2,7)$, $V(6,-1)$, and $W(3,-4)$. What is the midpoint of line segment UW?

Ⓐ $(-1,0)$

Ⓑ $(2,3)$

Ⓒ $\left(\frac{1}{2},\frac{3}{2}\right)$

Ⓓ $\left(\frac{5}{2},-\frac{1}{2}\right)$

18. To the nearest tenth, what is the perimeter of the parallelogram with the vertices (2,4), (4,1), $(-2,-2)$, and $(-4,1)$?

Ⓐ 10.0 units

Ⓑ 10.3 units

Ⓒ 20.0 units

Ⓓ 20.6 units

19. What is the perimeter of a triangle with vertices (1,3), $(-4,1)$, and $(-3,5)$, rounded to the nearest tenth?

Ⓐ 4.5 units

Ⓑ 12.0 units

Ⓒ 14.0 units

Ⓓ 22.4 units

20. $N = \begin{bmatrix} 3 & -2 \\ -1 & -5 \\ 4 & -7 \end{bmatrix}$ and $G = \begin{bmatrix} -3 & 4 \\ 5 & 5 \\ -26 & 20 \end{bmatrix}$

What is $-2N + 3G$?

Ⓐ $\begin{bmatrix} -2 & -8 \\ 6 & 3 \\ 19 & -12 \end{bmatrix}$

Ⓑ $\begin{bmatrix} -15 & 16 \\ 17 & 25 \\ -86 & 74 \end{bmatrix}$

Ⓒ $\begin{bmatrix} -15 & 5 \\ 16 & -26 \\ 5 & 20 \end{bmatrix}$

Ⓓ $\begin{bmatrix} -10 & -8 \\ -22 & 3 \\ 18 & -12 \end{bmatrix}$

21. What is the result of subtracting Matrix B from Matrix A? If the matrix does not exist, write *impossible*.

$$A = \begin{bmatrix} 7 \\ -4 \\ 3 \end{bmatrix} \quad B = \begin{bmatrix} -7 & 4 & -2 \end{bmatrix}$$

Ⓐ $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$

Ⓑ $\begin{bmatrix} -4 \\ 0 \\ 5 \end{bmatrix}$

Ⓒ $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$

Ⓓ Impossible

22. The Roma Pizza Restaurant charges a flat fee for a plain cheese pizza. There is an extra charge for any additional toppings. The cost of a pizza can be determined from the equation $C = 0.5m + 5$, where m is the number of additional toppings and C is the cost of the pizza ordered. What are the interpretations of slope and y-intercept in the equation?

Ⓐ slope: cost per additional topping
y-intercept: cost of the plain pizza

Ⓑ slope: cost per additional topping
y-intercept: cost of the first topping

Ⓒ slope: cost of the plain pizza
y-intercept: cost per additional topping

Ⓓ slope: ratio of cost of additional topping to the cost of the plain pizza
y-intercept: cost of an additional topping

23. The owners of an animal clinic kept a record of the numbers of dogs they treat 2004 and 2005. They separated the records by weight and gender, as shown in matrices below. How many male dogs, 25 pounds or greater, were treated duri two years shown?

2004

	Male	Female
< 25 lbs	120	116
25–40 lbs	212	230
> 40 lbs	85	76

2005

	Male	Fe
< 25 lbs	132	124
25–40 lbs	227	225
> 40 lbs	82	80

Ⓐ 439
Ⓑ 606
Ⓒ 611
Ⓓ 894

24. From a linear model for the data in the table below, which is the ***approximate*** average math score of students of the states whose average verbal score is 500?

Average S.A.T. Scores

State	Verbal	Math
FL	418	466
GA	401	443
MD	430	478
NC	401	440
SC	397	437
VA	425	470
WV	443	490

Ⓐ 600
Ⓑ 550
Ⓒ 500
Ⓓ 450

25. The table below shows the average amount a family of four spent on entertainment in a year.

Average Amount Spent on Entertainment

2002	2003	2004	2005
$836	$899	$949	$992

Assuming the trend continues, use the line of best fit to predict how muc the family of four will spend in 2008.

Ⓐ $1,049
Ⓑ $1,100
Ⓒ $1,152
Ⓓ $1,204

26. $Q = \begin{bmatrix} 7 & -3 & 8 \\ 6 & 0 & -1 \end{bmatrix}$, and $S = \begin{bmatrix} 13 & -6 & 25 \\ 4 & 17 & -1 \end{bmatrix}$

What is $5Q - 3S$?

Ⓐ $\begin{bmatrix} -4 & 3 & -35 \\ 18 & -51 & -2 \end{bmatrix}$
Ⓑ $\begin{bmatrix} -44 & 21 & -101 \\ -2 & -85 & 2 \end{bmatrix}$
Ⓒ $\begin{bmatrix} 74 & -33 & 115 \\ 42 & 51 & -8 \end{bmatrix}$
Ⓓ $\begin{bmatrix} 86 & -39 & 149 \\ 38 & 85 & -8 \end{bmatrix}$

27. The matrix below displays the average expenses (in dollars) for American consumers. Based on the trends in the data, which is the ***best*** estimate for Food expenses in 1994?

	1990	1995	2000	2005
Food	4,296	4,505	5,158	5,931
Housing	8,703	10,458	12,319	15,167
Transportation	5,120	6,014	7,417	8,344
Health Care	1,480	1,732	2,066	2,664

Ⓐ $4,101
Ⓑ $4,299
Ⓒ $4,390
Ⓓ $4,463

28. The matrices below represent the daily delivery of pizzas from Tom's Pizzeria, Sarah's Perfect Pizza Shop, and Juan's Pizza Quick Shop.

	Cheese	Hamburger	Pepperoni
Tom's	[25	18	35]
Sarah's	[42	23	56]
Juan's	[36	26	48]

On New Year's Eve, Tom's doubled their deliveries, Sarah's deliveries tripled, and Juan's deliveries were cut in half. Which matrix represents the combined deliveries for each type of pizza on New Year's Eve?

Ⓐ [103 67 139]
Ⓑ [248 157 334]
Ⓒ [206 134 278]
Ⓓ [194 118 262]

29. This chart shows per capita consumption of bottled water for selected years, 1980–2005. Based on a line of best fit of the data provided, how fast is the consumption of bottled water growing each year?

Year	1980	1985	1990	1995	2000	2005
Bottled Water (gallons per capita)	2.7	5.1	8.8	11.6	16.7	25.4

(A) increasing 0.59 gallon per year
(B) increasing 0.86 gallon per year
(C) increasing 0.91 gallon per year
(D) increasing 1.09 gallons per year

30. The data in the matrix below show the heights and weights for four people in a family.

Roberts Family Data

Name	Weight (lbs)	Height (in.)
Jamie	167	68
Casey	135	62
Frank	213	71
Howard	184	72

For which pair of people is the height difference the greatest?

(A) Jamie and Casey
(B) Frank and Howard
(C) Howard and Casey
(D) Jamie and Howard

31. Using the data in the matrix below, which is the largest difference in weight?

Roberts' Family Data

	Weight (lb)	Height (in.)
Jamie	75	68
Casey	61	62
Frank	97	71
Howard	84	72

(A) Jamie & Casey
(B) Frank & Howard
(C) Frank & Casey
(D) Jamie & Howard

32. Joe bought 4 hamburgers and 2 sodas for $12.50. Charley bought 3 hamburgers and 3 sodas for $11.25. What is the price of one hamburger?

(A) $1.25
(B) $1.50
(C) $2.25
(D) $2.50

33. When Jill babysits, she charges a flat fee of $7.00 plus $4.00 per hour. How can this relationship be expressed?

(A) $f(h) = 3h$
(B) $f(h) = 11h$
(C) $f(h) = 4h + 7$
(D) $f(h) = 7h + 4$

34. What is the solution to this system of equations?

$$\frac{1}{2}x - \frac{2}{3}y = -1$$
$$2x - \frac{1}{3}y = 3$$

(A) (6,6)
(B) (2,3)
(C) $(1,-3)$
(D) $(-2,0)$

35. The school booster club sold drinks at a football game, $3 for a small and $5 for a large. They sold 735 drinks total and made $3,125. How many small drinks were sold?

(A) 92
(B) 275
(C) 368
(D) 460

36. When the lines $2x + 5y = -11$ and $-4x - 6y = 2$ are graphed, what is their point of intersection?

Ⓐ (1.75, −1.5)

Ⓑ (2.75, −3.3)

Ⓒ (7, −5)

Ⓓ (9, −6)

37. Joe wants the perimeter of his garden to be at most 76 feet. He plans on making the length 22 feet. What is the maximum width of his garden?

Ⓐ 14 feet

Ⓑ 16 feet

Ⓒ 19 feet

Ⓓ 27 feet

38. Frank's parents are planning a graduation party for him. They want to spend $400 or less. The reception hall charges a $55 cleanup fee, plus $15 per person. How many people can Frank's parents invite and stay within their budget?

Ⓐ 15 people

Ⓑ 18 people

Ⓒ 23 people

Ⓓ 26 people

39. The cost to rent a car is $42.95 plus $0.18 per mile. How many miles would have to be driven for the total cost to be $54.11?

Ⓐ 54 miles

Ⓑ 62 miles

Ⓒ 97 miles

Ⓓ 239 miles

40. The value of y varies directly as the value of x. If $y = 135$ when $x = 54$, what is the value of y when $x = 27$?

Ⓐ 2.0

Ⓑ 2.5

Ⓒ 67.5

Ⓓ 270.0