

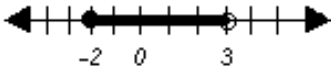
TEXAS ALLIANCE FOR MINORITIES IN ENGINEERING STATE MATH & SCIENCE COMPETITION

ALGEBRA I

General Information:

- Check to see that you have written your name on the label and that the test name on the label matches the name on this booklet.
- **DO NOT** open the test booklet and **DO NOT** start until the proctor says "begin."
- Each individual exam period will be 45 minutes and each exam contains 37 multiple choice questions.
- Students are allowed to use a non-programmable battery operated calculator during the individual and team exams.
- Students are encouraged to write on the exam booklet. Scratch paper and pencils will also be provided.
- Students will not be permitted to leave the test room while the test is in progress. If a student finishes early, he/she must remain in the test room until the exam period is completed.
- If you need to ask a question during the test, raise your hand and the proctor will come to you.
- There is no penalty for skipping a problem. The exam scores will be determined by the number of correct answers. All ties will be broken by awarding the place to the contestant who has the most consecutive correct answers before a problem is missed.
- **Students may NOT keep the test booklet.**

ALGEBRA I

1. By federal law, the ratio of the width to length of the U. S. flag is 10:19. If you want to make a flag with a 8 foot width, what should be the length?
a. 23.75 ft. b. 15.2 ft. c. 4.21 ft. d. 152 ft.
2. Lonnie earns 6% of the sale price of each house he sells. His commission on a sale was \$8,700. What was the value of the house?
a. \$52,200 b. \$152,000 c. \$450,000 d. \$145,000
3. There are 142 carats in one ounce. In 1905, a rough diamond weighing 3106 carats was discovered. To the nearest ounce, how much did the diamond weigh?
a. 12 oz. b. 48 oz. c. 22 oz. d. 36 oz.
4. A chemist has 20 liters of a 10% acid solution. How many liters of pure acid must be added to produce a 25% acid solution?
a. 4 liters b. 2 liters c. 5 liters d. 10 liters
5. Solve $5z - 4 > 2z + 8$
a. $z > 4$ b. $z < 1$ c. $z < 4$ d. $z > 1$
6. Solve $5w - (w - 8) > 9 + 3(2w - 3)$
a. $w < \frac{11}{5}$ b. $w < -\frac{11}{5}$ c. $w < -4$ d. $w < 4$
7. The sum of two consecutive positive integers is at most 3. What is the greater integer?
a. 5 b. 1 c. 3 d. 2
8. The books in Charlotte's library are between 2 cm and 6 cm wide. How many books can Charlotte put on a shelf that is 1 m long?
a. 50 or more b. 16 or less c. between 15 and 50 d. less than 50
9. What compound sentence is graphed at right?

a. $-2 < y < 3$ b. $-2 < y \leq 3$ c. $y \leq -2$ or $y < 3$ d. $-2 \leq y < 3$
10. Six times a number decreased by 15 is at least 27. What is the number?
a. -7 or greater b. 2 or less c. 7 or greater d. $\frac{1}{3}$ or less
11. Lallo earns \$23,500 in salary and an 8% commission on his sales. How much must he sell to have an income of over \$28,800 but not over \$34,100?
a. between \$66,250 and \$132,500 b. \$66,250 or more c. less than \$132,500 d. \$66,250 or less
12. If a is $\frac{2}{3}$ of b and b is $\frac{5}{7}$ of c , then $\frac{a}{c} =$
a. $\frac{10}{21}$ b. $\frac{14}{15}$ c. $\frac{7}{10}$ d. $\frac{9}{8}$
13. Which of the following is the greatest?
a. the number of which 12 is 30% c. the number of which 12 is 60%
b. the number of which 12 is 10% d. the number of which 12 is 100%
14. What is the simplest form of $m^4 \cdot m^2$?

- a. m^2 b. m^8 c. m^6 d. $2m^8$
15. What is the simplest form of $(3w^2v)(-2w^5v^2)(4w^6v^5)$?
 a. $-24w^{13}v^8$ b. $5w^{60}v^{10}$ c. $-24w^{60}v^{10}$ d. $5w^{13}v^8$
16. What is 0.000543 expressed in scientific notation?
 a. 5.43×10^4 b. 5.43×10^{-3} c. 543×10^6 d. 5.43×10^{-4}
17. Which of the following shows the terms of $x^2y^3 + 4xy^2 - 3x^3y + 6$ arranged so that the powers of x are in ascending order?
 a. $6 + 4xy^2 + x^2y^3 - 3x^3y$ c. $6 + 4xy^2 + 3x^3y - x^2y^3$
 b. $x^2y^3 + 3x^3y - 4xy^2 + 6$ d. $6 - 3x^3y + 4xy^2 + x^2y^3$
18. What are the next three numbers in this sequence? 1, 7, 17, 31, 49, ...
 a. 71, 97, 127 b. 64, 81, 100 c. 67, 85, 103 d. 61, 67, 71, 99
19. Solve $3^{2n-1} \cdot 3^{5n} = (3^4)^{n+2}$ for n.
 a. 25 b. 5 c. 3 d. 18
20. Simplify: $(9c^4d^5)(-6c^4d^5)$
 a. $3c^7d^9$ b. $3cd$ c. $-54c^7d^9$ d. $-54c^{12}d^{20}$
21. Find the solution of $6(n - 11) = 12 + 4(2n - 3)$
 a. -11 b. 11. c. -33 d. 33
22. Solve $\frac{7^{x-3}}{7^{3x-1}} = 1$ for x
 a. -2 b. 0 c. -1 d. 2
23. If $(2m - 1)(6m + 2) = 12m^2 - 2m - 2$, then $(2m + 1)(6m - 2) =$
 a. $12m^2 - 2m + 2$ b. $12m^2 + 2m - 2$ c. $12m^2 + 2m + 2$ d. $12m^2 + 10m + 2$
24. 16% of 980 is 9.8% of
 a. 1.6 b. 16 c. 160 d. 1600
25. If $3y + 3 \geq 6y$, then
 a. $y = 1$ b. $y > 1$ c. $y < 1$ d. $y \geq 1$
26. What is the prime factorization of 342?
 a. $2 \cdot 3 \cdot 57$ b. $1 \cdot 2 \cdot 3 \cdot 57$ c. $2 \cdot 3 \cdot 3 \cdot 19$ d. none of these
27. Find the GCF of $18n^3y^4w$ and $24n^5y$.
 a. $6n^5y^4w$ b. $6n^3y$ c. $24n^5y^4w$ d. $243n^3y$
28. If $8x^2 - 72y^2$ is factored completely, one of the factors is:
 a. $2x^2 - 18y^2$ b. $x + 3$ c. $x - 9y^2$ d. $x - 3y$
29. Simplify $\frac{3x^2 - 5x + 2}{x^2 - 3x + 2}$
 a. $\frac{3x - 2}{x - 2}$ b. $\frac{3x + 1}{x - 1}$ c. $\frac{3x - 5}{x - 3}$ d. $\frac{2}{3}$

30. Find $\frac{n^2 + 3n - 10}{n^2 + 6n + 8} = \frac{n^2 + 2n}{n - 2}$

a. $\frac{n(n+5)}{n+4}$

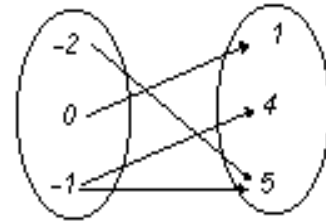
b. $\frac{(n+5)(n-2)^2}{(n+3)^3}$

c. $\frac{n+5}{n+2}$

d. $\frac{5x - 24 + -5^2}{(n-2)^2}$

31. Which set of ordered pairs shows the relation in the mapping?

- a. (-2, 5), (0, 1), (-1, 4), (-1, 5)
- b. (-2, -1), (0, 4), (-1, 5)
- c. (-1, 0), (4, -1), (5, -1), (5, -2)
- d. (-1, -2), (4, 0), (5, -1)



32. Find an equation of the line through (6, -3) with slope $\frac{2}{3}$.

a. $-2x + 3y = 24$

b. $-2x + 3y = -21$

c. $3x - 2y = 24$

d. $3x - 2y = -21$

33. If the system $\frac{1}{2}x + \frac{1}{3}y = 2$ is graphed, in which quadrant will the solution **not** be in?

a. I

b. II

c. III

d. IV

34. Find the equation of the axis of symmetry for the graph of $y = -2x^2 + x + 17$, and state whether the axis of symmetry contains the minimum or maximum point of the graph.

a. $x = \frac{1}{4}$; maximum

b. $x = -\frac{1}{4}$; maximum

c. $x = \frac{1}{4}$; minimum

d. $x = -\frac{1}{4}$; minimum

35.

Appliance	City A	City B	City C
Clothes Washer	83%	73%	91%
Freezer	37%	33%	53%
TV Set	88%	56%	69%

If City C has 3000 households, how many of them have a TV set?

1. 69

b. 2070

c. 3031

d. 1590

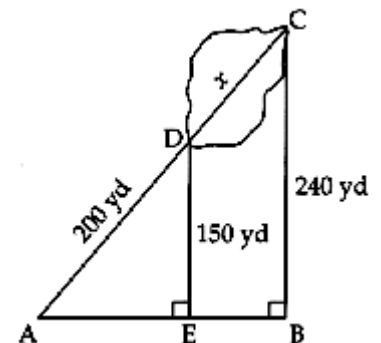
37. A surveyor wants to determine the distance x across a lake, but she is not able to make the measurement directly. She will use the similar triangles ADE and ACB shown below to help her determine the measurement. What is x ?

a. 75

b. 90

c. 150

d. 175



ALGEBRA I

1. b
2. d
3. c
4. a
5. a
6. d
7. d
8. c
9. d
10. c
11. d
12. a
13. b
14. c
15. a
16. d
17. a
18. a
19. c
20. c
21. c
22. c
23. b
24. d
25. d
26. c
27. b
28. d
29. a
30. a
31. a
32. b
33. b
34. a
35. b
36. a