

Do not remove this answer page — you will turn in the entire exam. You have two hours to do this exam. No books or notes may be used. You may use a graphing calculator during the exam, but NO calculator with a Computer Algebra System (CAS) or a QWERTY keyboard is permitted. Absolutely no cell phone use during the exam is allowed.

The exam consists of multiple choice and short answer questions. Record your answers on this page. For each multiple choice question, you will need to fill in the box corresponding to the correct answer. For example, if (c) is correct, you must write

a b c d e

Do not circle answers on this page, but please do circle the letter of each correct response in the body of the exam. It is your responsibility to make it CLEAR which response has been chosen. You will not get credit unless the correct answer has been marked on both this page and in the body of the exam.

GOOD LUCK!

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| 1. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 11. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e |
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| 5. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 15. <input type="text"/> |
| 6. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 16. <input type="text"/> |
| 7. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 17. <input type="text"/> |
| 8. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 18. <input type="text"/> |
| 9. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 19. <input type="text"/> |
| 10. <input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e | 20. <input type="text"/> |

For grading use:

Total	
	(out of 100 pts)

Multiple Choice Questions

Show all your work on the page where the question appears.
Clearly mark your answer both on the cover page on this exam
and in the corresponding questions that follow.

1. How many solutions does each equation have?

(I) $x^4 + 4 = 0$

(II) $x^3 = -5$

Possibilities:

- (a) Equation (I) has no solutions, and equation (II) has 1 solution.
 - (b) Equation (I) has 1 solution, and equation (II) has 3 solutions.
 - (c) Equation (I) has 2 solutions, and equation (II) has 1 solution.
 - (d) Equation (I) has no solutions, and equation (II) has 3 solutions.
 - (e) Equation (I) has 2 solutions, and equation (II) has no solutions.
-

2. Which expression is equal to $x^2 + 16x + 61$? **HINT:** Complete the square.

Possibilities:

- (a) $(x + 8)^2 - 3$
 - (b) $(x + 16)^2$
 - (c) $(x + 16)^2 + 61$
 - (d) $(x + 8)^2$
 - (e) $(x + 8)^2 + 3$
-

3. A ball is thrown straight upward at an initial speed of 96ft/sec. From Physics it is known that, after t seconds, the ball reaches a height h feet given by the formula

$$h = -16t^2 + 96t.$$

What is the maximum height reached by the ball?

Possibilities:

- (a) 171 ft
 - (b) 157 ft
 - (c) 3 ft
 - (d) 144 ft
 - (e) 8 ft
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4. Joni has \$5000. She invests a portion of her money at a simple interest rate of 6% and the rest of her money at a simple interest rate of 5.2%. After one year, the total interest earned on these investments is \$284.00. How much money did she invest at 6%?

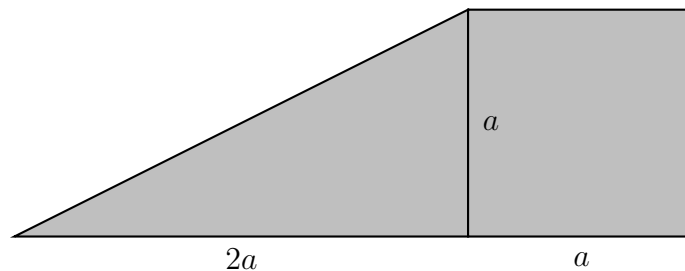
Possibilities:

- (a) \$4500.00
 - (b) \$3500.00
 - (c) \$4000.00
 - (d) \$2500.00
 - (e) \$3000.00
-

5. The area of the shaded region is 200 square feet. Find a .

Possibilities:

- (a) $\sqrt[3]{100}$ feet
- (b) $\sqrt{50}$ feet
- (c) $\sqrt{\frac{200}{3}}$ feet
- (d) 10 feet
- (e) $\sqrt[3]{200}$ feet



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6. How many solutions does each equation have?

(I) $2x^2 - x + 5 = 0$

(II) $6x^2 + 13x - 5 = 0$

Possibilities:

- (a) Equation (I) has 0 solutions, and equation (II) has 2 solutions.
 - (b) Equation (I) has 2 solutions, and equation (II) has 0 solutions.
 - (c) Equation (I) has 2 solutions, and equation (II) has 2 solutions.
 - (d) Equation (I) has 0 solutions, and equation (II) has 1 solution.
 - (e) Equation (I) has 0 solutions, and equation (II) has 0 solutions.
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7. A quantity, x , of a 20% acid solution is mixed with a 35% acid solution to produce 2500 mL of a 26% solution. Which of the equations below would you solve to find x ?

Possibilities:

- (a) $20x + 35(2500 - x) = 26$
- (b) $0.20x + 0.35(2500 - x) = 0.26(2500)$
- (c) $0.35x + 0.20(2500 - x) = 0.26$
- (d) $35x + 20(2500 - x) = 26$
- (e) $0.35x + 0.20(2500 - x) = 0.26(2500)$

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8. Solve the inequality.

$$3x + 13 \leq 9x + 20$$

Possibilities:

- (a) $\left(-\infty, \frac{-7}{6}\right] \cup \left[\frac{7}{6}, \infty\right)$
- (b) $\left[\frac{-7}{6}, \infty\right)$
- (c) $\left(-\infty, \frac{-7}{6}\right)$
- (d) $\left(\frac{-7}{6}, \infty\right)$
- (e) $\left(-\infty, \frac{-7}{6}\right]$

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9. The phrase, "All numbers x at most 5 units from 1," can be written mathematically as:

Possibilities:

- (a) $|x - 1| \geq 5$
- (b) $|x - 1| \leq 5$
- (c) $|x - 1| > 5$
- (d) $|x - 5| \leq 1$
- (e) $|x - 5| > 1$

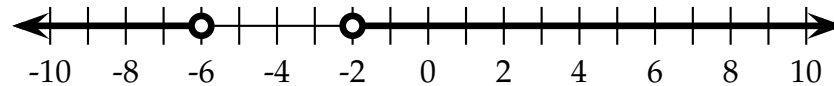
10. Solve the inequality.

$$\frac{x+8}{x-7} < 0$$

Possibilities:

- (a) $(-\infty, -8) \cup (7, \infty)$
- (b) $(-\infty, -8] \cup (7, \infty)$
- (c) $[-8, 7)$
- (d) $(-\infty, -8] \cup [7, \infty)$
- (e) $(-8, 7)$

11. Find the inequality that corresponds to the number line below.



Possibilities:

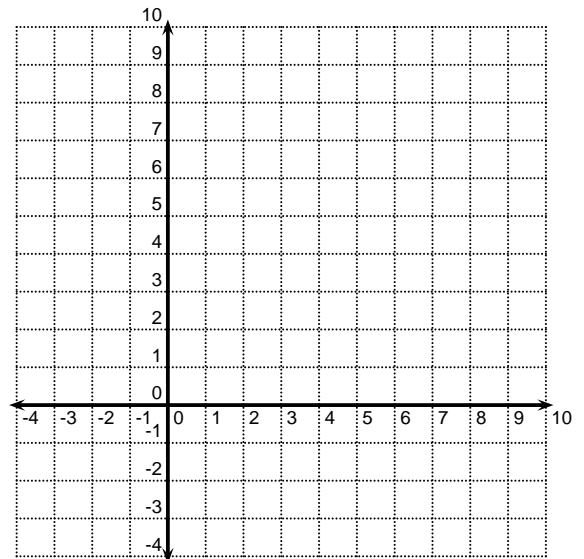
- (a) $|x + 4| > 2$
- (b) $|x + 4| < 2$
- (c) $|x - 4| > 2$
- (d) $|x - 2| > 4$
- (e) $|x - 2| < 4$

12. A circle has a diameter with endpoints $(21, 7)$ and $(13, 5)$. Find the radius of the circle.

Possibilities:

- (a) 6
- (b) $\sqrt{17}$
- (c) 17
- (d) 35
- (e) $2\sqrt{17}$

13. Find the **area** of the parallelogram ABCD with vertices A(-3, -2), B(3, -2), C(6, 5), and D(0, 5).



Possibilities:

- (a) $12 + 2\sqrt{58}$ square units
- (b) 21 square units
- (c) 26 square units
- (d) $6 + \sqrt{58}$ square units
- (e) 42 square units

14. If you live in Kentucky and your taxable income, i , is over \$8000 but not over \$75,000, then your state tax t , in dollars, is given by

$$t = 280 + .058(i - 8000).$$

Each member of one family paid between \$860 and \$2020 in Kentucky state taxes. How much money did the family members earn?

Possibilities:

- (a) Between \$13,000 and \$42,000.
 - (b) Between \$18,000 and \$38,000.
 - (c) Between \$15,000 and \$37,000.
 - (d) Between \$16,000 and \$40,000.
 - (e) Between \$14,000 and \$41,000.
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Short Answer Questions

Clearly write your answers in the spaces provided on the following pages.

15. Find all real solutions or state that there are NONE.

$$(x - 7)^2 + 7 = (x - 3)^2 + 8.$$

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16. Find all real solutions or state that there are NONE.

$$x^4 - 17x^2 + 16 = 0.$$

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17. Find all real solutions or state that there are NONE.

$$x^3 + x + 1 = x + 65.$$

18. Find all real solutions or state that there are NONE.

$$\sqrt{x+7} = x+5.$$

19. Find all real solutions or state that there are NONE.

$$\frac{x}{x+4} - \frac{x}{x-7} = \frac{9}{x^2 - 3x - 28}.$$

20. Solve the equation for a.

$$a(x+n) = k+r.$$
