

# MTH 28, Test 3, V. 3, 25/11/24

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NAME: \_\_\_\_\_

There are 22 questions. Some are multiple choice and some are free response.  
Each question is worth 5 points over 100 (so 10 points are extra credit).  
For multiple-choice questions, just circle your answer.  
For free-response questions, SHOW ALL WORK to receive credit.

1. Simplify each of the following:

(a)  $\sqrt{32} =$  \_\_\_\_\_

(b)  $\sqrt{27} =$  \_\_\_\_\_

(c)  $\sqrt{18} =$  \_\_\_\_\_

(d)  $\sqrt{50} =$  \_\_\_\_\_

(e)  $\sqrt{72} =$  \_\_\_\_\_

(f)  $\sqrt{300} =$  \_\_\_\_\_

2. Evaluate the expression:  $125^{-\frac{2}{3}}$

3. Write the expression

$$\left(\frac{a^{-3}}{3b^{-1/6}}\right)^{-1}$$

in the form  $\frac{n \cdot a^r}{b^t}$ .

4. Write using rational exponents:  $\sqrt[3]{x^{10}}$

5. Write the expression

$$\sqrt{108} - \sqrt{48}$$

in the form  $A\sqrt{C}$ .

6. Find the product

$$(-5\sqrt{3})(4\sqrt{5})$$

and write it in simplest radical form  $A\sqrt{C}$ .

7. Multiply and simplify

$$(8 + 2\sqrt{2})(8 - 2\sqrt{2})$$

**Circle the answer.**

(a)  $72 - 32\sqrt{2}$

(b) 56

(c)  $72 + 32\sqrt{2}$

(d) 72

8. Simplify.

$$-4\sqrt{27} - 2\sqrt{12} - 2\sqrt{147}$$

**Circle the answer.**

(a)  $-8\sqrt{3}$

(b)  $-8\sqrt{27}$

(c)  $-30\sqrt{9}$

(d)  $-30\sqrt{3}$

9. Rationalize (that is, write without radicals in the denominator):

$$\frac{\sqrt{13} - \sqrt{3}}{\sqrt{13} + \sqrt{3}}$$

10. Simplify the expression

$$\sqrt{\frac{75}{11}},$$

and write it in the form  $\frac{A\sqrt{B}}{C}$ .

11. Simplify completely

$$\frac{\sqrt{2}\sqrt{30}}{\sqrt{5}}$$

**Circle the answer.**

- (a)  $4\sqrt{3}$
- (b)  $\sqrt{12}$
- (c)  $2\sqrt{3}$
- (d)  $3\sqrt{2}$

12. Multiply and simplify

$$(3 + 2\sqrt{7})^2$$

**Circle the answer.**

- (a)  $37 + 12\sqrt{7}$
- (b)  $23 + 12\sqrt{7}$
- (c) 35
- (d)  $37 - 12\sqrt{7}$

13. Solve the equation

$$\sqrt{2x-1} - 5 = 0$$

14. Solve the equation

$$\sqrt{2x+1} = 3\sqrt{x-1}$$

15. Multiply

$$(-11 - 6i)(-8 - 9i)$$

16. Write  $\sqrt{-32}$

as the product of a real number and  $i$ .

**Circle the answer.**

(a)  $-2\sqrt{4}i$

(b)  $-4\sqrt{2}$

(c)  $4\sqrt{2}i$

(d)  $2\sqrt{4}i$

**17.** Solve the quadratic equation

$$x^2 - 5x - 5 = 0$$

and write the solutions in simplified form.

**18.** Solve the equation

$$\sqrt{4x} = x - 3.$$

**19.** Evaluate the expression

$$\frac{-3 + i}{1 + 4i}$$

and write the result in the form  $a + bi$ .

**20.** Solve the quadratic equation

$$3x^2 + 8x - 3 = 0$$

and write the solutions in simplified form.

**21.** Evaluate the expression

$$(7 + 2i) + (-5 + 7i)$$

and write the result in the form  $a + bi$ .

**22.** Solve the equation

$$2x^2 - 14 = 0$$