

# Luzerne County Mathematics Contest

Luzerne County Council of Teachers of Mathematics

Wilkes University – 2018 Junior Examination

(Section 1)

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

SCHOOL: \_\_\_\_\_ CITY/ZIP: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_

**Directions:** For each problem, write your answer in the space provided. Do not use approximations. Simplify all fractions and radicals. Your answer must be complete to receive credit for a problem.

1)

1)  $\underline{[-1, -\frac{1}{2}) \cup (1, +\infty)}$

2)

2)  $d = \underline{\sqrt{2A}}$

3)

3)  $\underline{14}$

4)

4)  $\underline{\frac{8}{13} - \frac{1}{13}i}$

5)

5)  $x = \underline{8, 125}$

6)

6)  $y_0 = \underline{6}$

7)

7)  $\underline{2}$

8)

8)  $\underline{\frac{-2x-h}{x^2(x+h)^2}}$

9)

9)  $\underline{180}$

10)

10)  $\underline{2\sqrt[3]{2}}$

(OVER)

11)

11)  $\frac{\sqrt{3}-1}{2\sqrt{2}}$  or  $\frac{\sqrt{2}-\sqrt{3}}{2}$

12)

12)  $\frac{5\sqrt{3}}{2}$

13)

13)  $c = \frac{3}{8}i, r = \frac{9}{8}$

14)

14)  $x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

15)

15)  $\sqrt{3} - \pi/2$

16)

16)  $x = 1$

17)

17)  $0$

18)

18)  $\theta = \frac{\pi}{6}, \frac{5\pi}{6}$

19)

19)  $2$

20)

20)  $5$

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**Directions:** For each problem, write your answer in the space provided. Do not use approximations. Simplify all fractions and radicals. Your answer must be complete to receive credit for a problem.

1)

1)  $-1+2i$

2)

2)  $C$

3)

3)  $-\frac{\sqrt{6}}{12}$

4)

4)  $x = \pm\sqrt{2}$

5)

5)  $\pi/2$

6)

6)  $x = 7/5$

7)

7)  $2x+2+h$

8)

8)  $x = 2, 3$

9)

9)  $5/36$

10)

10)  $4/5$

(OVER)

11)

11)  $2 + 3 \log_a b - \frac{1}{2} \log_a c$

12)

12)  $-\frac{15}{29}$

13)

13)  $2\sqrt{2} - 1$

14)

14)  $2$

15)

15)  $x = 6$

16)

16)  $\sqrt{2} + 1$

17)

17)  $6\sqrt{3}$

18)

18)  $c$

19)

19)  $a$

20)

20)  $128$

# Luzerne County Mathematics Contest

Luzerne County Council of Teachers of Mathematics

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(Section 2)

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

SCHOOL: \_\_\_\_\_ CITY/ZIP: \_\_\_\_\_

TELEPHONE: \_\_\_\_\_

**Directions:** For each problem, write your answer in the space provided. Do not use approximations. Simplify all fractions and radicals. Your answer must be complete to receive credit for a problem.

- 1) \_\_\_\_\_ 1)  $f^{-1}(x) = \frac{4x+5}{2-x}$
- 2) \_\_\_\_\_ 2)  $3\sqrt{2} - 4$
- 3) \_\_\_\_\_ 3)  $r = \frac{4\sqrt{2}}{\pi}$
- 4) \_\_\_\_\_ 4)  $c$
- 5) \_\_\_\_\_ 5)  $x = 16$
- 6) \_\_\_\_\_ 6)  $b$
- 7) \_\_\_\_\_ 7)  $1$
- 8) \_\_\_\_\_ 8)  $2$
- 9) \_\_\_\_\_ 9)  $70$
- 10) \_\_\_\_\_ 10)  $43$

(OVER)

11)

$$11) x = \underline{5}$$

12)

$$12) x = \underline{4 - \sqrt{3}}$$

13)

$$13) \underline{(-2, 2), (1, 4), (1, 5)}$$

14)

$$14) x = \underline{\frac{1}{2}}$$

15)

$$15) b = \underline{13}$$

16)

$$16) \underline{6}$$

17)

$$17) \underline{\frac{\sqrt{5} + 1}{2}}$$

18)

$$18) \underline{1}$$

19)

$$19) \underline{-6}$$

20)

$$20) \underline{\frac{6^3}{256}}$$

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(Section 2)

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TELEPHONE: \_\_\_\_\_

**Directions:** For each problem, write your answer in the space provided. Do not use approximations. Simplify all fractions and radicals. Your answer must be complete to receive credit for a problem.

1)

1) a

2)

2)  $(-\frac{7\sqrt{2}}{2}, \frac{7\sqrt{2}}{2})$

3)

3)  $[-\frac{1}{2}, 2]$

4)

4) 1

5)

5)  $b = -2, c = 3$

6)

6)  $d = 2\sqrt{\frac{A}{\pi}}$

7)

7) d

8)

8)  $x^6$

9)

9)  $\frac{2}{5}$

10)

10)  $(0, 8)$

(OVER)

11)

$$11) \theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

12)

$$12) x = \underline{1}$$

13)

$$13) L = \underline{6^{14}}, S = \underline{5^{15}}$$

14)

$$14) \underline{-28}$$

15)

$$15) f^{-1}(x) = \frac{2x+b}{x-1}$$

16)

$$16) \underline{1 + \sin \theta}$$

17)

$$17) x = \underline{1, 3}$$

18)

$$18) x = \underline{-1/4}$$

19)

$$19) \underline{b}$$

20)

$$20) c = \underline{b-a}$$