

Worksheet Level 2:

Goals:

Identify Rational & Irrational #s

Concept # _____

Practice #1

Classify each number as RATIONAL (Q) or IRRATIONAL (I)

1) $\sqrt{47}$

2) $\frac{11}{9}$

3) $\frac{19}{4}$

4) $\sqrt{96}$

5) $\frac{19}{14}$

6) $\frac{15}{4}$

7) $\sqrt{84}$

8) -9

9) $\sqrt{72}$

10) 0

11) $\frac{8}{9}$

12) 3

13) 7

14) -7

15) -4

16) 5

17) -11

18) -14

19) $\sqrt{59}$

20) 9

Practice #2

Tell whether each expression is *rational* or *irrational*.

1. $-\sqrt{64}$

2. $\sqrt{1600}$

3. $\pm\sqrt{160}$

4. $\sqrt{144}$

5. $\sqrt{125}$

6. $-\sqrt{340}$

7. $\sqrt{1.96}$

8. $-\sqrt{0.09}$

Practice #3

1. Which set below includes only irrational numbers?

- A. $\{-\sqrt{12}, -3.7\bar{6}, \sqrt{36}, 4.3858\dots\}$
B. $\{-7.2322\dots, \sqrt{5}, \sqrt{15}, 8.27451\dots\}$
C. $\{-5.6, \sqrt{14}, 6.3245, \sqrt{81}\}$
D. $\{-\sqrt{8}, 3\bar{7}, 3.265165065\dots, \sqrt{90}\}$

2. Which set contains only irrational numbers

- A. $\{-8, -\sqrt{4}, \sqrt{3}, \sqrt{16}\}$
B. $\{-\sqrt{64}, \sqrt{0}, \sqrt{19}, \sqrt{13}\}$
C. $\{-\sqrt{26}, -\sqrt{16}, \sqrt{2}, \sqrt{8}\}$
D. $\{-\sqrt{50}, -\sqrt{13}, \sqrt{10}, \sqrt{54}\}$

3. Which set contains an irrational number?

- A. $\{2300, 0.48, \frac{13}{1}\}$
B. $\{18, 0.1, \frac{12}{5}\}$
C. $\{\frac{3}{8}, 4, \sqrt{52}\}$
D. $\{0.333\dots, \sqrt{4}, 10\}$

4. Which of the following is an irrational number?

- A. $\sqrt{16}$ B. $\sqrt{144}$ C. $\sqrt{4}$ D. $\sqrt{3}$

5. Which of the following is an irrational number?

- A. $\frac{4}{3}$ B. $\sqrt{24}$ C. $\sqrt{81}$ D. -4.07

6. Which list contains only rational numbers?

- A. $-4, 0, \frac{1}{4}, \sqrt{\frac{9}{4}}$ B. $0, \frac{1}{2}, 1.5, \sqrt{8}$
C. $-2, 1, 2.\bar{6}, \sqrt{\frac{3}{2}}$ D. $0, 0.\bar{36}, 4, \sqrt{24}$

7. What type of number is $\sqrt{26}$?

- A. Whole number B. Integer
C. Rational number D. Irrational number

8. Which number below is an element in the set of irrational numbers?

$$\sqrt{4}, 3.45, -8.7, \sqrt{2}$$

- A. $\sqrt{4}$ B. 3.45 C. -8.7 D. $\sqrt{2}$

9. Which set of real numbers contains only rational numbers?

- A. $\{\sqrt{121}, \sqrt{196}, \sqrt{24}, 12\}$
B. $\{\sqrt{144}, \frac{13}{2}, \frac{5}{3}, \sqrt{3}\}$
C. $\{\sqrt{169}, \frac{4}{2}, \sqrt{121}, \frac{11}{4}\}$
D. $\{\sqrt{169}, \frac{58}{3}, \frac{13}{2}, \sqrt{31}\}$

Unit Conversions Practice

Make the following conversions:

- 1) Convert 16.7 inches to feet

- 2) Convert 25 yards to feet (there are 3 feet in a yard)

- 3) Convert 90 centuries to years

- 4) Convert 84 miles to kilometers (there are 0.6 miles in a kilometer)

- 5) Convert 4.75 centimeters to meters

- 6) Convert 48,987 minutes to days

- 7) Convert 27 months to fortnights (there are 14 days in a fortnight and ~30 days in a month)

- 8) Convert 0.09 miles to inches (there are 36 inches in a yard and 1760 yards in a mile)

- 9) Convert 4.66 centimeters to miles (there are 0.6 miles in a kilometer)

- 10) Convert 556 degrees Celsius to Kelvins

- 11) Convert 25 Kelvins to degrees Celsius

I. Mixed Review

Add or subtract.

1. $(3x^3 + 4x^2 + 1) + (2x^2 + 10)$

2. $(-4x^2 + 3x - 1) - (4x + 2)$

3. $(-8x^3 + 4x - 1) - (4x^2 - x)$

4. $(7x^3 + 6x^2 + x - 1) + (9x^3 + 4x^2 - x + 10)$

5. $(9x^5 - 7x^3 + x) + (6x^4 + 9x^3)$

6. $(5x^2 - 7x + 10) - (6x^2 + 8x - 5)$

7. $(10x^2 - 8x + 10) - (6x^2 + 7x + 10)$

8. $(4x^4 + 3x^3 + 2x^2 + x) + (3x^4 - 4x^3 + 2x^2 - x)$

9. $(8x^3 + 5x + 1) + (10x^3 + 4x^2)$

10. $(17x^5 + 5x^3 + x) - (6x^5 + 4x^3 + x)$

Multiply.

11. $2x(4x^2 + 5x + 10)$

12. $3x^2(2x^2 + 2x + 1)$

13. $(x + 1)(x + 10)$

14. $(x + 2)(x - 2)$

15. $(x^2 + 1)(x^2 - 5)$

16. $(x + 9)(x^2 + 7x)$

17. $(x + 1)(x^2 + 5x + 10)$

18. $(x^2 + 5)(x^3 + 2x + 1)$

Divide.

~~19. $(x^2 + 10x + 16) \div (x + 2)$~~

~~20. $(x^3 - 4x^2 + 7x - 6) \div (x - 2)$~~

~~21. $(x^3 - x^2 + 8x - 8) \div (x - 1)$~~

~~22. $(x^3 + 13x^2 + 39x - 5) \div (x + 5)$~~

~~23. $(x^3 - 27) \div (x - 3)$~~

~~24. $(x^3 - 3x^2 - 9x) \div (x - 5)$~~

~~25. $(x^3 - 7x^2 - 17x - 9) \div (x + 1)$~~

~~26. $(12x^3 + 23x^2 + 10x + 2) \div (3x + 2)$~~

II. Challenge Problems

27. Add: $(3x^3y^3 + 2x^2y + xy^2 + y^3) + (4x^3y^3 - 4x^2y - 5xy^2 - 6y^3)$

28. $P(x)$, $D(x)$, $Q(x)$ and $R(x)$ are polynomials.
If $P(x)$ is divided by $D(x)$, the quotient is $Q(x)$ with remainder $R(x)$.
What is the value of $P(x)$ in terms of $D(x)$, $Q(x)$ and $R(x)$?

29. If the base of a triangle is given by the expression $(3x^2 + 4x)$ and the height of the triangle is given by the expression $(4x^2 + 4x + 6)$, what is an expression for the area of the triangle, in terms of x ?

30. Correct the Error

There is an error in the student work shown below:

Question: Multiply $(3x^2 + x - 8)(x - 1)$.

Solution:

$$\begin{aligned}(3x^2 + x - 8)(x - 1) &= \\ &= 3x^3 + x^2 - 8x - 3x^2 - x + 8 \\ &= 3x^3 - 4x^2 - 9x + 8 \\ \text{The answer is } &3x^3 - 4x^2 - 9x + 8.\end{aligned}$$

What is the error? Explain how to solve the problem.

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Practice #1

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1) $\sqrt{47}$ I

2) $\frac{11}{9}$ R

3) $\frac{19}{4}$ R

4) $\sqrt{96}$ $2\sqrt{24}$ $4\sqrt{6}$ I

5) $\frac{19}{14}$ R

6) $\frac{15}{4}$ R

7) $\sqrt{84}$ $2\sqrt{21}$ I

8) -9 R

9) $\sqrt{72}$ $3\sqrt{8}$ $6\sqrt{2}$ I

10) 0 R

11) $\frac{8}{9}$ R

12) 3 R

13) 7 R

14) -7 R

15) -4 R

16) 5 R

17) -11 R

18) -14 R

19) $\sqrt{59}$ I

20) 9 R

Practice #2

Tell whether each expression is rational or irrational.

1. $-\sqrt{64} = -8$
R

2. $\sqrt{1600} = 40$
R

3. $\pm\sqrt{160}$ I
 $\pm 4\sqrt{10}$

4. $\sqrt{144}$ 12 R

5. $\sqrt{125}$ $5\sqrt{5}$
I

6. $-\sqrt{340}$

7. $\sqrt{1.96}$

8. $-\sqrt{0.09}$

Practice #3

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- C. $-2, 1, 2.\bar{6}, \sqrt{\frac{1}{2}}$
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- B. Integer
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- A. $\sqrt{4}$
- B. 3.45
- C. -8.7
- D. $\sqrt{2}$**

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- B. $\{\sqrt{144}, \frac{12}{7}, \frac{1}{3}, \sqrt{3}\}$
- C. $\{\sqrt{169}, \frac{1}{2}, \sqrt{121}, \frac{14}{4}\}$**
- D. $\{\sqrt{169}, \frac{22}{7}, \frac{12}{7}, \sqrt{31}\}$

Unit Conversions Practice – Answer Key

- 1) Convert 16.7 inches to feet
1.39 feet
- 2) Convert 25 yards to feet (there are 3 feet in a yard)
8.3 yards
- 3) Convert 90 centuries to years
9,000 years
- 4) Convert 84 miles to kilometers (there are 0.6 miles in a kilometer)
140 km
- 5) Convert 4.75 centimeters to meters
0.0475 meters
- 6) Convert 48,987 minutes to days
34.019 days
- 7) Convert 27 months to fortnights (there are 14 days in a fortnight and ~30 days in a month)
57.9 fortnights
- 8) Convert 0.09 miles to inches (there are 36 inches in a yard and 1760 yards in a mile)
 1.4×10^{-6} miles
- 9) Convert 4.66 centimeters to miles (there are 0.6 miles in a kilometer)
 2.8×10^{-5} miles
- 10) Convert 556 degrees Celsius to Kelvins
829 K
- 11) Convert 25 Kelvins to degrees Celsius
 -248° C

III. Answer Key

1. $3x^3 + 6x^2 + 11$
2. $-4x^2 + 7x - 3$
3. $-8x^3 - 4x^2 + 5x - 1$
4. $16x^3 + 10x^2 + 9$
5. $9x^5 + 6x^4 + 2x^3 + x$
6. $-x^2 - 15x + 15$
7. $4x^2 - 15x$
8. $7x^4 - x^3 + 4x^2$
9. $18x^3 + 4x^2 + 5x + 1$
10. $11x^5 + 9x^3$
11. $8x^3 + 10x^2 + 20x$
12. $6x^4 + 6x^3 + 3x^2$
13. $x^2 + 11x + 10$
14. $x^2 - 4$
15. $x^4 - 4x^2 - 5$
16. $x^3 + 16x^2 + 63x$
17. $x^3 + 6x^2 + 15x + 10$
18. $x^5 + 7x^3 + x^2 + 10x + 5$
19. $x + 8$
20. $x^2 - 2x + 3$
21. $x^2 + 8$
22. $x^2 + 8x - 1$
23. $x^2 + 3x + 9$
24. $x^2 + 2x + 1$ remainder 5
25. $x^2 - 8x - 9$
26. $4x^2 + 5x$ remainder 2
27. $7x^3y^3 - 2x^2y - 4xy^2 - 5y^3$
28. $P(x) = D(x)Q(x) + R(x)$
29. $6x^4 + 14x^3 + 26x^2 + 24x$
30. The student incorrectly added $+x^2$ and $-3x^2$; the answer should be $3x^3 - 2x^2 - 9x + 8$.