MATH 9

FINAL EXAM REVIEW BOOK 1

UNIT 1 - RATIONAL NUMBERS + SQUARE ROOTS

UNIT 2 - EXPONENTS

NAME: _____ BLOCK: _____

Study Checklist

This review booklet is by no means a "practice final". It is a collection of practice questions on each unit, meant to guide your final exam studying and prepare you for the types of questions you are likely to see. DO NOT treat this booklet as a practice test. If you're stuck on a question, look it up and ask for help! DO NOT go straight to the answer key when you come across a question you cannot remember how to do. Difficult questions SHOULD guide your study! Always look up a concept in your class notes if you are stuck, then attempt the question again.

BEFORE **beginning this booklet you should:**

- read through your class notes booklet on *each topic*
- make your own "quick summary page" of important formulas & key concepts for the unit
- review quizzes & tests from the unit to recall strengths & weaknesses *(a great study method would be to re-do old quizzes & tests on a separate piece of paper)*

WHILE **working through this booklet you should:**

- look up concepts & example problems in your class notes when you come across a problem you are stuck on
- make a list of "questions to ask my teacher" so you can come to class and use your time efficiently.

Questions I'm having difficulty with:

Page	Question Number #	Topic

Unit 1: Rational Numbers & Square Roots Summary

my notes and things to remember...

Unit 1: Rational Numbers & Square Roots

1. Determine if the statements are true or false.

a) All rational numbers can be written as fractions. T / F

b) All decimals can be written as fractions. T / F

c) All square roots are not rational. T / F

2. Which of the following numbers are rational?

$\left\{-4,\ 0,\ \frac{2}{3},\ \sqrt{9},\ 2.\overline{1},\ \sqrt{5},\ -2.1313...,\ 3.7569...\right\}$

3. Use either $<$ or $>$ to write a true statement.

a) $0.3 \_\_\_\_ 0.\overline{3}$

b) $-0.3 \_\_\_\_ -0.\overline{3}$

c) $\frac{7}{8} \_\_\_\_ \frac{8}{9}$

d) $-\frac{7}{8} \_\_\_\_ -\frac{7}{9}$

e) $\frac{9}{13} \_\_\_\_ \frac{9}{14}$

f) $-\frac{9}{13} \_\_\_\_ -\frac{9}{14}$

g) $2.5\overline{2} \_\_\_\_ 2.\overline{52}$

h) $-2.5\overline{2} \_\_\_\_ -2.\overline{52}$

4. Determine a fractional rational number and a decimal rational number between each pair of rational numbers.

a) $0.3,\ 0.\overline{3}$ _____

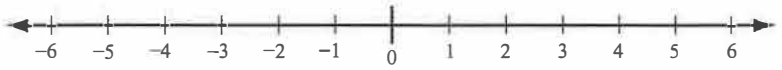
b) $\frac{7}{8},\ \frac{8}{9}$ _____

c) $3\frac{1}{4},\ 3\frac{1}{3}$ _____

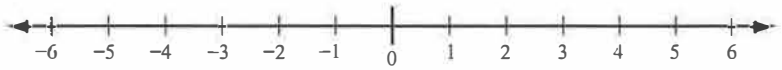
d) $-\frac{12}{11},\ -\frac{13}{12}$ _____

5. Show the following statements on the number line.

a) $-2+6=4$

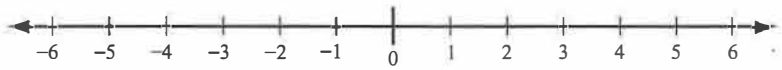


b) $-2+(-3)=-5$

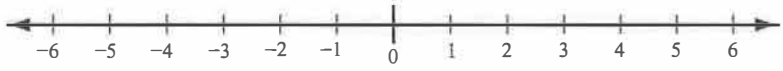


c) $4+(-7)=-3$

d) $3-(-2)=5$



e) $-5-(-8)=3$



6. Add or subtract.

a) $-3.1+2.73$ _____ **b)** $-3.1+(-2.73)$ _____

c) $4.42-(-2.6)$ _____ **d)** $-4.42-(-2.6)$ _____

e) $5.625-3.8$ _____ **f)** $5.625-(-3.8)$ _____

g) $-5.625-3.8$ _____ **h)** $-5.625-(-3.8)$ _____

i) $-2.735-1.64-(-0.728)$ _____ **j)** $-2.735-(-1.64)-0.728$ _____

7. Add or subtract. Leave answer in fraction form.

a) $3\frac{1}{3}+\frac{5}{3}$ _____ **b)** $3\frac{1}{3}+\left(-\frac{5}{3}\right)$ _____

c) $3\frac{1}{3}-\frac{5}{3}$ _____ **d)** $3\frac{1}{3}-\left(-\frac{5}{3}\right)$ _____

e) $-2\frac{1}{5}+\frac{13}{5}+3\frac{3}{5}$ _____ **f)** $-2\frac{1}{5}+\left(-\frac{13}{5}\right)-3\frac{3}{5}$ _____

g) $2\frac{1}{5}-\frac{13}{5}-\left(-3\frac{3}{5}\right)$ _____ **h)** $-\left(-2\frac{1}{5}\right)-\left(-\frac{13}{5}\right)-3\frac{3}{5}$ _____

i) $-2\frac{1}{5}-\frac{13}{5}-\left(-3\frac{3}{5}\right)$ _____ **j)** $-2\frac{1}{5}-\left(-\frac{13}{5}\right)-3\frac{3}{5}$ _____

8. Add or subtract. Leave answer in fraction form.

a) $\frac{2}{3}+\frac{5}{6}$ _____ **b)** $\frac{2}{3}-\frac{5}{6}$ _____

c) $-\frac{3}{4}+\frac{1}{3}$ _____ **d)** $-\frac{3}{4}-\frac{1}{3}$ _____

e) $\frac{5}{8}-\frac{11}{12}+\frac{7}{15}$ _____ **f)** $-\frac{5}{8}+\frac{11}{12}-\left(-\frac{7}{15}\right)$ _____

g) $\frac{5}{8}-\left(-\frac{11}{12}\right)-\frac{7}{15}$ _____ **h)** $-\frac{5}{8}+\left(-\frac{11}{12}\right)+\left(-\frac{7}{15}\right)$ _____

i) $3\frac{1}{4}-1\frac{2}{3}+3\frac{5}{6}$ _____ **j)** $-3\frac{1}{4}+1\frac{2}{3}-\left(-3\frac{5}{6}\right)$ _____

9. Multiply. Leave answer in fraction form.

a) $\frac{1}{3}\times\frac{12}{7}$ _____ **b)** $-\frac{8}{9}\times\frac{21}{16}$ _____

c) $\frac{8}{25}\times\frac{35}{4}\times 0.4$ _____ **d)** $\frac{5}{14}\times\left(-\frac{21}{10}\right)\times\frac{15}{7}$ _____

e) $-\frac{7}{4}\times\frac{2}{21}\times\frac{14}{8}$ _____ **f)** $\frac{9}{121}\times\left(-\frac{11}{18}\right)\times\left(-\frac{27}{33}\right)$ _____

10. Divide.

a) $\frac{2}{3}\div\frac{8}{9}$ _____ **b)** $-0.75\div\frac{15}{8}$ _____

c) $\frac{12}{5}\div 4$ _____ **d)** $4\div\frac{12}{15}$ _____

e) $\frac{34}{121}\div\frac{17}{55}$ _____ **f)** $-\frac{38}{27}\div\frac{57}{18}$ _____

11. Simplify. Leave answer in mixed fraction form.

a) $3\frac{1}{2}\times 2\frac{1}{3}$ _____ **b)** $3\frac{1}{2}\div 2\frac{1}{3}$ _____

c) $-5\frac{2}{5}\times 3\frac{1}{3}$ _____ **d)** $-5\frac{2}{5}\div 3\frac{1}{3}$ _____

e) $3.75\div 1\frac{1}{8}\times 1\frac{2}{25}$ _____ **f)** $3\frac{1}{4}\div 2\frac{7}{16}\times 1\frac{1}{8}$ _____

1. Determine whether each statement is always true, sometimes true, or never true.

a) A negative integer is a rational number. _____

b) An irrational number times an irrational number is irrational. _____

c) Fractions are irrational numbers. _____

2. Which of the following are irrational numbers:
$-\frac{2}{3}$, $\sqrt{2}$, π, 0, $-3\frac{1}{2}$, 2.1111..., 1.121121112...

3. Simplify.

a) $\sqrt{144}+\sqrt{25}$ _____ **b)** $\sqrt{144+25}$ _____

c) $\sqrt{25}-\sqrt{9}$ _____ **d)** $\sqrt{25-9}$ _____

4. A rectangle half as wide as it is long has an area of 98 cm². Determine the perimeter of the rectangle.

5. A right triangle has one leg twice as long as the other with an area of 289 cm². What is the length of each leg?

6. Between what two integers does the irrational number fall?

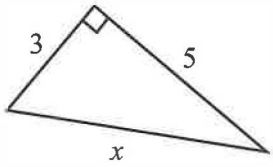
a) $\sqrt{327}$ _____ **b)** $-\sqrt{173}$ _____

7. Without a calculator determine the square roots of the irrational numbers to one decimal place.

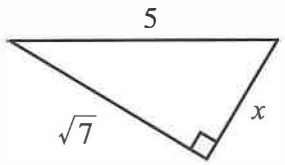
a) $\sqrt{327}$ _____ **b)** $-\sqrt{173}$ _____

8. Solve for x to one decimal place.

a)



b)



_____ _____

_____ _____

Unit 2: Exponents Summary

my notes and things to remember...

Unit 2: Exponents

9. Find the missing exponents to make the equation correct.

a) $64 = 8^{?} = 4^{?} = 2^{?}$ _____ **b)** $81 = 9^{?} = 3^{?}$ _____

c) $256 = 16^{?} = 4^{?} = 2^{?}$ _____ **d)** $729 = 27^{?} = 9^{?}$ _____

10. Assume that $0 < a < 1$. Arrange the following in order from least to greatest: $-(-a)^3$, $-a^3$, $(-a)^4$, $-a^4$

11. Evaluate.

a) -3^0 _____ **b)** $(-3)^0$ _____

c) $(2+3)^0$ _____ **d)** 2^0+3^0 _____

e) $(2-3)^{100}$ _____ **f)** $(2-3)^{199}$ _____

g) $-(-1)^{50}-(-1)^{51}$ _____ **h)** $-1^{100}-1^{101}$ _____

i) -1^0-1^0 _____ **j)** $-(1-1)^0$ _____

12. Use $<$, $>$ or $=$ to write a true sentence.

a) $(-3)^5$ ___ -3^5 **b)** $(-3)^8$ ___ -3^8

c) $\left(-\frac{3}{4}\right)^2$ ___ $\left(-\frac{3}{4}\right)^4$ **d)** $\left(-\frac{4}{3}\right)^2$ ___ $\left(-\frac{4}{3}\right)^4$

e) 2^5 ___ 5^2 **f)** $(-4)^2$ ___ $(-2)^4$

g) $\left(-\frac{7}{9}\right)^5$ ___ $\left(-\frac{7}{9}\right)^7$ **h)** $\left(-\frac{9}{7}\right)^5$ ___ $\left(-\frac{9}{7}\right)^7$

13. Simplify.

a) $4-3\times 2^2$ _____ **b)** $4-(3\times 2)^2$ _____

c) $(4-3)\times 2^2$ _____ **d)** $\dfrac{(8-2)\times 3}{8-2\times 3}$ _____

e) $\dfrac{8+2\times 3}{(8-2)\times 3}$ _____ **f)** $\dfrac{8-2\times 3}{(8+2)\times 3}$ _____

g) $-2\times 3^2-4\times 2^2$ _____ **h)** $(-2\times 3)^2-(4\times 2)^2$ _____

i) $-2\times(3^2-4)\times 2^2$ _____ **j)** $(-2\times 3^2-4)\times 2^2$ _____

14. Insert parentheses to make the expression true.

a) $-4+1^2+2-3^3=8$ **b)** $6\div 2+1\times 4=8$

c) $3+2\times 3-1^2=11$ **d)** $8\div 8-4+3=8$

15. Simplify. Leave answer in exponential form.

a) $3^4\times 2^3\times 3^2\times 2$ _____ **b)** $3^0\times 3^1\times 3^2$ _____

c) $(-3)^4\times 3^2$ _____ **d)** $(-5)^3\times 5^2\times(-5)^0$ _____

e) $\dfrac{4^3\times 4^5}{4^4}$ _____ **f)** $\dfrac{(-3)^5}{(-3)^2\times 3^2}$ _____

g) $\dfrac{(-2)^5\times 2^2}{(-2)^2}$ _____ **h)** $\dfrac{2^4\times 2^x}{2^{x-1}}$ _____

16. Simplify, then evaluate.

a) $3^2 \times 3 - 3^3 \times 3^0$ _____ **b)** $2^4 \div 2 + 2^3 \times 2^2$ _____

c) $(-4)^5 \div 4^3 + (-4)^3 \div 4$ _____ **d)** $(-5)^4 \div 5^2 - (-5)^2$ _____

e) $\dfrac{(-2)^4 + (-2)^3}{(-2)^2}$ _____ **f)** $\dfrac{-3^0 - 3^3}{(-2)^5 - (-2)^2}$ _____

Section 1.7

17. Write in exponential form.

a) $(3^2)^4$ _____ **b)** $(2^5)^6$ _____

c) $[(3^2)^4]^3$ _____ **d)** $[(-2)^2]^3$ _____

e) $[(-5)^3]^3$ _____ **f)** $[(-4)^3]^6$ _____

18. Evaluate.

a) $(2^5 \div 2^3)^2$ _____ **b)** $(2^3 \times 2)^2$ _____

c) $(1+2)^3 - (5-2)^2$ _____ **d)** $(2^2)^3 - (2^2+1)^2$ _____

e) $[(-3)^2 - 2^2]^2 - [(-2)^2 - 3]^2$ _____ **f)** $\left[\dfrac{(-3)^5}{3^3}\right]^2 - \left[\dfrac{(-2)^5}{2^3}\right]^3$ _____

Unit 1: Rational Numbers & Square Roots ANSWER KEY

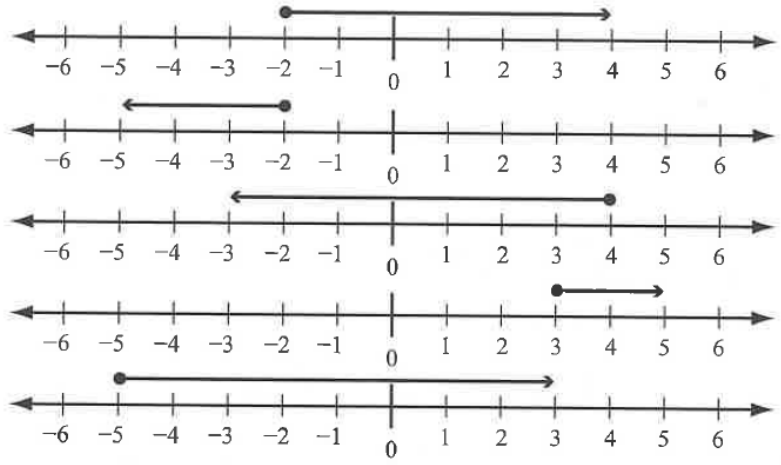
1. **a)** T **b)** F **c)** F

2. $-4,\ 0,\ \frac{2}{3},\ \sqrt{9},\ 2.\overline{1},\ -2.1313...$

3. **a)** < **b)** > **c)** < **d)** < **e)** > **f)** < **g)** < **h)** >

4. (answers will vary) **a)** $\frac{31}{100}, 0.31$ **b)** $\frac{22}{25}, 0.88$ **c)** $3\frac{3}{10}, 3.3$ **d)** $-\frac{287}{264}, -1.09$

5. **a)**



b)

c)

d)

e)

6. **a)** −0.37 **b)** −5.83 **c)** 7.02 **d)** −1.82 **e)** 1.825 **f)** 9.425 **g)** −9.425 **h)** −1.825
i) −3.674 **j)** −1.823

7. **a)** 5 **b)** $1\frac{2}{3}$ **c)** $1\frac{2}{3}$ **d)** 5 **e)** 4 **f)** $-8\frac{2}{5}$ **g)** $3\frac{1}{5}$ **h)** $1\frac{1}{5}$ **i)** $-1\frac{1}{5}$ **j)** $-3\frac{1}{5}$

8. **a)** $1\frac{1}{2}$ **b)** $-\frac{1}{6}$ **c)** $-\frac{5}{12}$ **d)** $-1\frac{1}{12}$ **e)** $\frac{7}{40}$ **f)** $\frac{91}{120}$ **g)** $1\frac{3}{40}$ **h)** $-2\frac{1}{120}$ **i)** $5\frac{5}{12}$ **j)** $2\frac{1}{4}$

9. **a)** $\frac{4}{7}$ **b)** $-\frac{7}{6}$ **c)** $\frac{28}{25}$ **d)** $-\frac{45}{28}$ **e)** $-\frac{7}{24}$ **f)** $\frac{9}{242}$

10. **a)** $\frac{3}{4}$ **b)** $-\frac{2}{5}$ **c)** $\frac{3}{5}$ **d)** 5 **e)** $\frac{10}{11}$ **f)** $-\frac{4}{9}$

11. **a)** $8\frac{1}{6}$ **b)** $1\frac{1}{2}$ **c)** −18 **d)** $-1\frac{31}{50}$ **e)** $3\frac{3}{5}$ **f)** $1\frac{1}{2}$

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1. **a)** always true **b)** sometimes true **c)** never true

2. $\sqrt{2},\ \pi,\ 1.121121112...$

3. **a)** 17 **b)** 13 **c)** 2 **d)** 4

4. $A = \frac{1}{2} \cdot x \cdot x = 98 \rightarrow x^2 = 196 \rightarrow x = 14$; perimeter $= 14 + 14 + 7 + 7 = 42$ cm

5. $A = \frac{1}{2} \cdot 2x \cdot x = 289 \rightarrow x^2 = 289 \rightarrow x = 17$; legs are 17 cm and 34 cm

6. **a)** 18, 19 **b)** −13, −14

7. **a)** 18.1 **b)** −13.2

8. **a)** 5.8 **b)** 4.2

Unit 2: Exponents ANSWER KEY

9. **a)** 2, 3, 6 **b)** 2, 4 **c)** 2, 4, 8 **d)** 2, 3

10. $-a^3,\ -a^4,\ (-a)^4,\ -(-a)^3$

11. **a)** -1 **b)** 1 **c)** 1 **d)** 2 **e)** 1 **f)** -1 **g)** 0 **h)** -2 **i)** -2 **j)** undefined

12. **a)** $=$ **b)** $>$ **c)** $>$ **d)** $<$ **e)** $>$ **f)** $=$ **g)** $<$ **h)** $>$

13. **a)** -8 **b)** -32 **c)** 4 **d)** 9 **e)** $\frac{7}{9}$ **f)** $\frac{1}{15}$ **g)** -34 **h)** -28 **i)** -40 **j)** -88

14. **a)** $(-4+1)^2+(2-3)^3=8$ **b)** $6\div(2+1)\times 4=8$ **c)** $3+2\times(3-1)^2=11$

d) $8\div(8-(4+3))=8$

15. **a)** $2^4\times 3^6$ **b)** 3^3 **c)** 3^6 **d)** -5^5 **e)** 4^4 **f)** -3 **g)** -2^5 **h)** 2^5

16. **a)** 0 **b)** 40 **c)** -32 **d)** 0 **e)** 2 **f)** $\frac{7}{9}$

17. **a)** 3^8 **b)** 2^{30} **c)** 3^{24} **d)** 2^6 **e)** -5^9 **f)** 2^{36} or 4^{18}

18. **a)** 16 **b)** 256 **c)** 18 **d)** 39 **e)** 24 **f)** 145