

Midterm Review #2

Chapters 3, 2, 5 & 6



Chapter 3 Review

Begin by defining the following:

- a) Mixed number – a whole number with a fraction
- b) Improper fraction – the numerator is larger than the denominator

Skill	Explained in words	Mathematical Example
Converting a MIXED NUMBER to an IMPROPER FRACTION	WHOLE NUMBER MULTIPLIED BY DENOMINATOR (BOTTOM) ADD TO THE NUMERATOR (TOP)	$4\frac{3}{5} = \frac{23}{5}$
Converting an IMPROPER FRACTION to a MIXED NUMBER	DIVIDE THE NUMERATOR BY THE DENOMINATOR, THE WHOLE NUMBER IS PLACED TO THE LEFT, AND THE REMAINDER IS LEFT IN FRACTION FORM	$\frac{19}{4} = 4\frac{3}{4}$
Adding Fractions Subtracting Fractions	<ul style="list-style-type: none"> - CONVERT TO IMPROPER FRACTIONS - FIND A COMMON DENOMINATOR - ADD/SUBTRACT NUMERATOR, LEAVE DENOMINATOR ALONE - SIMPLIFY 	$2\frac{2}{3} + 7\frac{3}{4}$ $\frac{8 \times 4}{3 \times 4} + \frac{31 \times 3}{4 \times 3}$ $\frac{32}{12} + \frac{93}{12}$ $= \frac{125}{12} = 10\frac{5}{12}$
Multiplying Fractions	<ul style="list-style-type: none"> - CONVERT TO IMPROPER FRACTIONS - CROSS SIMPLIFY - MULTIPLY TOP x TOP & BOTTOM x BOTTOM - SIMPLIFY (IF YOU HAVEN'T ALREADY) 	$3\frac{6}{7} \times 2\frac{2}{3}$ $\frac{27}{7} \times \frac{8}{3}$ $\frac{72}{7} = 10\frac{2}{7}$

Skill	Explained in words	Mathematical Example
Dividing Fractions	SAME AS MULTIPLICATION BUT WE FLIP THE SECOND FRACTION AND MULTIPLY	$3\frac{3}{5} \div 2\frac{1}{10}$ $\frac{18}{5} \div \frac{21}{10}$ $\frac{18}{5} \times \frac{10}{21}$ $= \frac{12}{7}$ $= 1\frac{5}{7}$
Order of Operations with Fractions	FOLLOW BEDMAS	See below!!

Main Question	Side Work	Explanation
$(-\frac{2}{3}) \div [\frac{1}{4} - (-\frac{1}{2})] \times \frac{1}{3}$		START WITH SQUARE BRACKETS, SIMPLIFY EXCESS NEGATIVES
$(-\frac{2}{3}) \div [\frac{1}{4} + \frac{1}{2}] \times \frac{1}{3}$	$\frac{1}{4} + \frac{1 \times 2}{2 \times 2}$ $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$	FIND A COMMON DENOMINATOR & ADD
$(-\frac{2}{3}) \div \frac{3}{4} \times \frac{1}{3}$	$(-\frac{2}{3}) \times \frac{4}{3} = -\frac{8}{9}$	DO DIVISION FIRST, KISS & FLIP.
$-\frac{8}{9} \times \frac{1}{3} = -\frac{8}{27}$		MULTIPLY

Chapter 3 Practice Questions

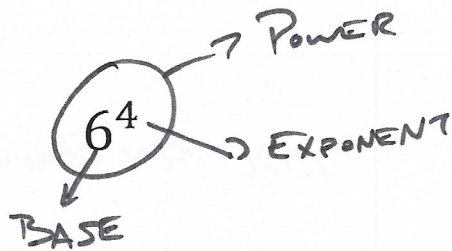
1. $2\frac{3}{4} + 1\frac{1}{5}$	2. $3\frac{1}{4} - 2\frac{3}{8}$	3. $1\frac{1}{3} \times 2\frac{1}{5}$
4. $1\frac{4}{11} \div 1\frac{1}{4}$	5. $(2 - \frac{3}{4}) \times (-\frac{5}{2}) \div (-\frac{11}{4})$	6. $(-\frac{2}{3})^2 \times (-3) \div 1\frac{2}{3}$

Answers:

1. $3\frac{19}{20}$	2. $\frac{7}{8}$	3. $2\frac{14}{15}$	4. $1\frac{1}{11}$	5. $1\frac{3}{22}$	6. $-\frac{4}{5}$
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Chapter 2 Review

Label the following:



Your answers can be given in THREE different ways, complete this table:

Answer as a POWER	Answer as REPEATED MULTIPLICATION	Answer in STANDARD FORM
6^5	$6 \times 6 \times 6 \times 6 \times 6$	7776
$(-3)^3$	$(-3) \times (-3) \times (-3)$	-27
What would you change in the above question to get a positive answer (except removing the negative sign)?		
* CHANGE EXPONENT TO EVEN NUMBER		
-5^4	$-(5 \times 5 \times 5 \times 5)$	-625
Why is the answer to the above question <u>always</u> negative?		
* THE EXPONENT DOES NOT AFFECT THE NEGATIVE SIGN, IT IS NOT INCLUDED IN REPEATED MULTIPLICATION.		

There were five main Exponent Laws that we looked at this year:

Name of Law	Explained in words	Mathematical Example (Answer as a Power)	
Product of Powers	- BASES MUST BE IDENTICAL - ADD EXPONENTS	$8^4 \times 8^8$ 8^{4+8} 8^{12}	
Quotient of Powers	- BASES ARE EXACTLY THE SAME - SUBTRACT EXPONENTS	$5^7 \div 5^2$ 5^{7-2} 5^5	
Power of a Power	MULTIPLY EXPONENTS	$(9^4)^3 \rightarrow 9^{4 \times 3}$ 9^{12}	
Power of a Product	- PRODUCT OF POWERS - PLACE EXPONENT ON EACH NUMBER	Answer as a Product of Powers	Answer as a Single Power
	- SINGLE POWER FOLLOW BEDMAS PLACE EXPONENT ON ANSWER	$(3 \times 7)^4$ $3^4 \times 7^4$	$(3 \times 7)^4$ 21^4
Power of a Quotient	PLACE EXPONENT ON TOP & BOTTOM	$\left(\frac{3}{4}\right)^5$ $\frac{3^5}{4^5}$	

Chapter 2 Practice Questions (write all answers as powers, except 6 which is a standard form)

1. $(-2)^3 \times (-2)^6$	2. $-9^{18} \div -9^7$	3. $(5^5)^2$
4. $\left(\frac{3}{2}\right)^5$	5. $(3 \times 9)^4$	6. $\frac{(-12)^2 \times (-12)^4}{(-2)^2 - 12^0}$

Answers:

1. $(-2)^9$	2. -9^{11}	3. 5^{10}	4. $\frac{3^5}{2^5}$	5. $(3^4 \times 9^4)$	6. 995328
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Chapter 5 Review

Begin by defining the following:

- Equation - A GROUP OF #s AND LETTERS WITH AN EQUAL SIGN
- Expression - A " " " " " " " " WITHOUT " " " "
- Term - A NUMBER, VARIABLE, OR PRODUCT OF NUMBERS & VARIABLES
- Variable - A LETTER TAKING THE PLACE OF A NUMBER
- Coefficient - A NUMBER JOINED TO A VARIABLE BY MULTIPLICATION
- Constant - A NUMBER BY ITSELF

Complete the following table:

Example	Equation or Expression	# of Terms	Variable(s)	Coefficient(s)	Constant(s)
$4n^2$	Expression	1	n	4	none
$3n^2 - 4y = 8$	Equation	3	y, n	3, -4	8
$-3x^2 - 5n = 3t - 9$	Equation	4	x, n, t	-3, -5, 3	-9
$p - 2$	Expression	2	p	1	-2

We can classify polynomials in two different ways:

- By THE NUMBER OF TERMS \rightarrow MONOMIAL (1), BINOMIAL (2), TRINOMIAL (3)
- By THE DEGREE OF THE POLYNOMIAL \rightarrow HIGHEST EXPONENT PRESENT

Complete the following table:

Example	Classify by Number of Terms	Classify by Degree
$4n - 6n^3$	BINOMIAL	3 RD
$-857n^5 + 216n^2 - 9$	TRINOMIAL	5 TH
$-92163n^9$	MONOMIAL	9 TH

When solving a question, you need to first identify which like terms are present. To be considered "like terms", the following must BOTH be true:

- HAVE THE EXACT SAME VARIABLE
- HAVE THE EXACT SAME EXPONENT

Identify the like terms from below:

$$\begin{array}{ccc}
 8n^2 & & -6n \\
 \boxed{24n} & \begin{array}{c} \underline{12x^2} \\ 9n^2x \end{array} & \begin{array}{c} \boxed{-3x^2} \\ \underline{\quad} \end{array} \\
 & & \begin{array}{c} \textcircled{7nx} \\ \textcircled{-83xn} \end{array}
 \end{array}$$

When we add polynomials:

$$\begin{array}{r}
 (3n^2 + 2n + 4) + (-5n^2 + 3n - 5) \\
 \underline{3n^2 + 2n + 4} \quad \underline{-5n^2 + 3n - 5} \\
 -2n^2 + 5n - 1
 \end{array}$$

When we subtract polynomials:

$$\begin{array}{r}
 (-2n^2 + n - 1) - (n^2 - 3n + 2) \\
 \underline{-2n^2 + n - 1} \quad \underline{-n^2 + 3n - 2} \\
 -3n^2 + 4n - 3
 \end{array}$$

When we multiply polynomials:

$$3n(4n^2 - 8n + 2)$$
$$12n^3 - 24n^2 + 6n$$

When we divide polynomials:

$$\frac{8n^3 - 12n^2 + 4n}{2n}$$
$$\frac{8n^3}{2n} - \frac{12n^2}{2n} + \frac{4n}{2n}$$
$$4n^2 - 6n + 2$$

Chapter 5 Practice Questions

Add the following polynomials:

- $(3n^3 - n^4 + 4n^2) + (2n^3 - n - 7n^2)$
- $(4n + 2n^3 + 2n^2) + (5n + n^3 - 5n^2)$

Subtract the following polynomials:

- $(3 - 6n^5 - 8n^4) - (-6n^4 - 3n - 8n^5)$
- $(14p^4 + 11p^2 - 9p^5) - (-14 + 5p^5 - 11p^2)$

Multiply the following:

- $-8n(-3n^3 + 7n^2 - 4n + 9)$
- $4x^3(13x^5 + 18x^3 - 28x^4 - 8x)$

Divide the following:

7. $\frac{-21n^3 - 7n^2 + 49n}{-7n}$

8. $\frac{42x^5 + 48x^3 - 18x^4 - 54x^6}{6x^2}$

9. Also do question #19ab on page 257 in the textbook.

Answers:

1. $-n^4 + 5n^3 - 3n^2 - n$	2. $3n^3 - 3n^2 + 9n$
3. $2n^5 - 2n^4 + 3n + 3$	4. $-14p^5 + 14p^4 + 22p^2 + 14$
5. $24n^4 - 56n^3 + 32n^2 - 72n$	6. $52x^8 - 112x^7 + 72x^6 - 32x^4$
7. $3n^2 + n - 7$	8. $-9x^4 + 7x^3 - 3x^2 + 8x$
9. a) Large Rectangle: $(2s)(3s + 2) = 6s^2 + 4s$ Small Rectangle: $(2s)(s + 1) = 2s^2 + 2s$ b) $(6s^2 + 4s) - (2s^2 + 2s) = 4s^2 + 2s$	

CHAPTER 3 QUESTIONS

$$1/ \quad 2\frac{3}{4} + 1\frac{1}{5}$$

$$\frac{11 \times 5}{4 \times 5} + \frac{6 \times 4}{5 \times 4} = \frac{55}{20} + \frac{24}{20} = \frac{79}{20} = 3\frac{19}{20}$$

$$2/ \quad 3\frac{1}{4} - 2\frac{3}{8} = \frac{13 \times 2}{4 \times 2} - \frac{19}{8} = \frac{26}{8} - \frac{19}{8} = \frac{7}{8}$$

$$3/ \quad 1\frac{1}{3} \times 2\frac{1}{5} = \frac{4}{3} \times \frac{11}{5} = \frac{44}{15} = 2\frac{14}{15}$$

$$4/ \quad 1\frac{4}{11} \div 1\frac{1}{4} = \frac{15}{11} \div \frac{5}{4} = \frac{15^3}{11} \times \frac{4}{5} = \frac{12}{11} = 1\frac{1}{11}$$

$$5/ \quad \left(2 - \frac{3}{4}\right) \times \left(-\frac{5}{2}\right) \div \left(-\frac{11}{4}\right) = \left(\frac{8}{4} - \frac{3}{4}\right) \times \left(-\frac{5}{2}\right) \div \left(-\frac{11}{4}\right)$$

$$= \frac{5}{4} \times \left(-\frac{5}{2}\right) \div \left(-\frac{11}{4}\right) = -\frac{25}{8} \div -\frac{11}{4} = -\frac{25}{8} \times \frac{4}{11} = \frac{25}{22} = 1\frac{3}{22}$$

$$6/ \quad \left(-\frac{2}{3}\right)^2 \times (-3) \div 1\frac{2}{3} = \frac{4}{9} \times \frac{-3^1}{1} \div \frac{5}{3} = \frac{-4}{3} \times \frac{3}{5} = \frac{-12}{15} = -\frac{4}{5}$$

CHAPTER 2 QUESTIONS

$$1. \quad (-2)^3 \times (-2)^6 = (-2)^9$$

$$2. \quad -9^{18} \div -9^7 = -9^{11}$$

$$3. \quad (5^3)^2 = 5^{10}$$

$$4. \quad \left(\frac{3}{2}\right)^5 = \frac{3^5}{2^5}$$

$$5. \quad (3 \times 9)^4 \\ = 3^4 \times 9^4$$

$$6. \quad \frac{(-12)^2 \times (-12)^4}{(-2)^2 - 12^0}$$

$$= \frac{(-12)^6}{4 - 1}$$

$$= 995328$$

CHAPTER 5 QUESTIONS

$$1. (3n^3 - n^4 + 4n^2) + (2n^3 - n - 7n^2) \\ = -n^4 + 5n^3 - 3n^2 - n$$

$$2. (4n + 2n^3 + 2n^2) + (5n + n^3 - 5n^2) \\ = 3n^3 - 3n^2 + 9n$$

$$3. (3 - 6n^5 - 8n^4) - (-6n^4 - 3n - 8n^5) \\ = 3 - 6n^5 - 8n^4 + 6n^4 + 3n + 8n^5 \\ = 2n^5 - 2n^4 + 3n + 3$$

$$4. (14p^4 + 11p^2 - 9p^5) - (-14 + 5p^5 - 11p^2) \\ 14p^4 + 11p^2 - 9p^5 + 14 - 5p^5 + 11p^2 \\ - 14p^5 + 14p^4 + 22p^2 + 14$$

$$5. -8n(-3n^3 + 7n^2 - 4n + 9) \\ 24n^4 - 56n^2 + 32n^2 - 72n$$

$$6. 4nx^3(13x^5 + 18x^3 - 28x^4 - 8x) \\ 52x^8 + 72x^6 - 112x^7 - 32x^4 \rightarrow 52x^8 - 112x^7 + 72x^6 - 32x^4$$

$$7. \frac{-21n^3 - 7n^2 + 419n}{-7n} = 3n^2 + n - 7$$

$$8. \frac{42x^5 + 48x^3 - 18x^4 - 54x^6}{6x^2} = -9x^4 + 7x^3 - 3x^2 + 8x$$