MATHEMATICS DEPARTMENT
HOUSTON COMMUNITY COLLEGE

MATH 0308 FINAL REVIEW PROBLEMS

Revised 10-22-07

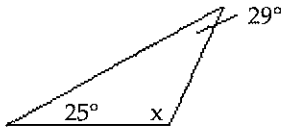
These exercises represent a compilation of typical problems in this course. This is NOT a sample of the final exam. However, doing these problems will help you to prepare for the final exam. The instructions for the problems are followed by bracketed references to appropriate sections in the book.

Find the sum of the angle measures of the specified polygon. [8.1]

1) A pentagon.

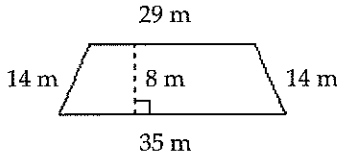
Find the missing angle measure. [8.1]

2)



Find the perimeter and area of the polygon. [8.2, 8.3]

3)



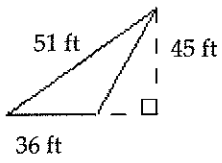
Solve the problem. [8.2]

4) A vegetable garden is 20 ft by 15 ft. A fence is to be built around the garden. How many feet of fence will be needed? If fencing sells for $3.10 per foot, what will the fencing cost?

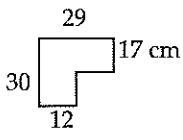
Find the area. [8.2, 8.3]

5) Of a rectangle measuring $7\frac{1}{3}$ mi by $4\frac{2}{3}$ mi.

6)

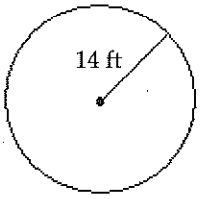


7)



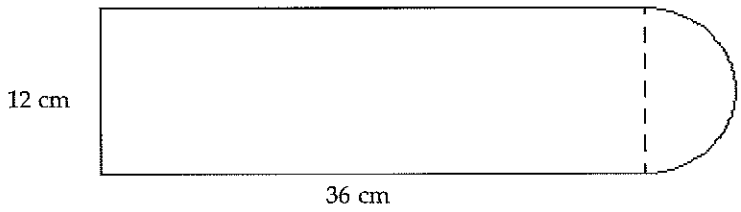
Find the circumference and area of the circle. Use $\frac{22}{7}$ for π. [8.4]

8)



Find the perimeter and area of the figure. Use 3.14 for π. [8.4]

9)

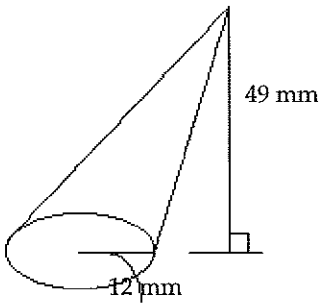


Find the volume and surface area. [8.5]

10) Of a rectangular solid 2 yd × 7 yd × 8 yd

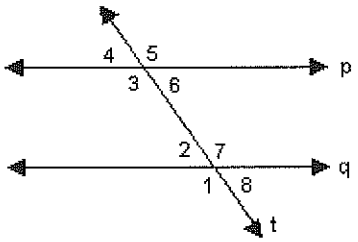
Find the volume. Use $\frac{22}{7}$ for π. [8.5]

11) Of the circular cone pictured below.



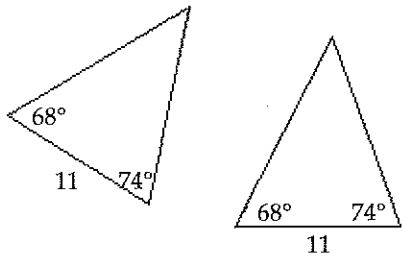
Use the properties of parallel lines to solve the problem. [8.6]

12) If p ∥ q and m∠8 = 45°, what are the measures of the other angles?



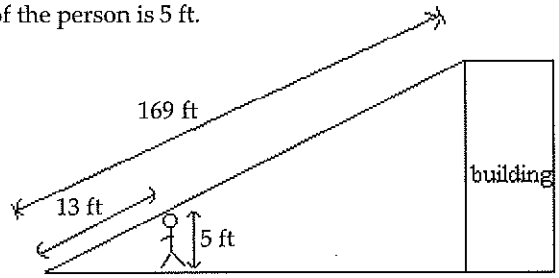
Which property (if any) should be used to show that the triangles are congruent? [8.7]

13)



Use a proportion to solve the problem. [8.8]

14) Find the height of the building. Assume that the height of the person is 5 ft.



Simplify. [9.2 – 9.6, 9.8]

15) $3 + (-8) - 16 - (-11) + 15$

16) $\dfrac{35}{-14 + 14}$

17) $5\,[-6 + 3^2 - 5(2 - 4)\,] + |\,8(-9)\,|$

18) $\dfrac{-8^2 - 18 \div 3 + 5 \cdot 2}{2 - 7}$

Solve the equation. [9.7, 10.1 – 10.3]

19) $\frac{3}{4}x = 24$

20) $-3.8q = -16.8 - 1.4q$

21) $\frac{2x}{5} - \frac{x}{3} = 3$

22) $-5x + 6(3x - 6) = -15 - 8x$

Solve the formula for the specified variable. [10.4]

23) $N = \frac{f + h + x}{6}$ for h

Solve the problem. [10.5, 10.6]

24) Sam left a \$4 tip for a meal that cost \$25.
   a) What percent of the cost of the meal was the tip?
   b) What was the total cost of the meal, including the tip?

25) If the first and third of three consecutive odd integers are added, the result is 63 less than five times the second integer. Find the third integer.

26) Find the length of a rectangular lot with a perimeter of 82 meters if the length is 7 meters more than the width. (P = 2L + 2W)

27) The second angle of a triangle is 3 times as large as the first angle. The third angle is 40° greater than the first angle. How large are the angles?

Solve the inequality. Give the solution set, and graph the solutions. [10.7]

28) $11n - 11 \leq 13n - 5$

29) $-\frac{4}{7} > -2x$

Solve the problem. [10.8]

30) Jim has gotten scores of 99 and 93 on his first two tests. What score must he get on his third test to keep an average of 85 or greater?

Graph the linear equation. [11.1]

31) $y = -\frac{1}{2}x + 1$

32) $3y - 6x = 12$

Simplify the expression. Use positive exponents. Assume variables represent nonzero real numbers. [12.1 -12.2]

33) $\frac{2x^0y}{4^1y^3}$

34) $\frac{-24x^8y^{-7}}{8x^6y^2}$

35) $(2p^{-3}q^4)^3\,(p^{-2}q^3)$

36) $\left(\dfrac{3p^{-3}v^4}{s^2}\right)^4$

37) $\left(\dfrac{-2y^3}{5}\right)^{-2}$

Write the number in scientific notation. [12.2]

38) .000060112

Perform the indicated operation. Write the answer in scientific notation. Then convert the answer to decimal notation. [12.2]

39) $\dfrac{8.4 \times 10^{-1}}{2.1 \times 10^{-3}}$

Perform the indicated operation. Write the answer in scientific notation. [12.2]

40) $(4 \times 10^5)(8 \times 10^7)$

Evaluate the polynomial. [12.3]

41) $-6x^2 + 6x - 8$ for $x = -2$

Collect like terms and write in descending order. [12.3]

42) $-10m^8 + 14m^6 - 9m^2 + 15m^8 - 6m^6$

Identify the degree of each term and the degree of the polynomial. [12.3]

43) $7x - 8x^2 + 9 - 5x^3$

Add or subtract as indicated. [12.4, 12.7]

44) $(6x^2y - 2xy) - (3x^2y + 5xy^2) - (4xy + 6xy^2)$

Find the product. [12.5 – 12.6]

45) $-10x^3(-9x^7 + 2x^6 - 5)$

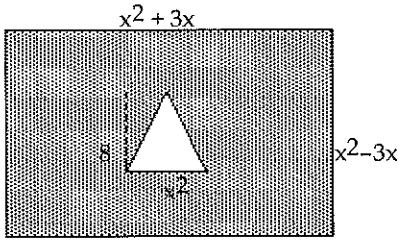
46) $(4p - 1)(16p^2 + 4p + 1)$

47) $(-3 + x)(5x - 12)$

48) $(9m + 2)^2$

Solve the problem. [8.3, 12.5]

49) Find a polynomial that represents the area of the shaded region.



Perform the division. Write the answer with positive exponents. [12.8]

50) $(12x^8 - 6x^6 - 10x^3) \div (-2x^3)$

Perform the indicated operation. [12.8]

51) $\dfrac{42m^5n - 12m^4n^5 + 18m^3n^7}{6m^2n}$

Factor out the greatest common factor. [13.1]

52) $48x^9y^9 + 12x^4y^4 - 60x^6y^2$

Factor by grouping. [13.1]

53) $6 - 2x - 3y + xy$

Factor completely. [13.2, 13.5]

54) $4x^3 + 4x^2 - 48x$

55) $x^4 - 1$

Factor. [13.2 - 13.4]

56) $2x^2 - x - 15$

57) $x^2 - 18xy + 81y^2$

Write the expression in lowest terms. [14.1]

58) $\dfrac{2x + 2}{6x^2 + 16x + 10}$

Multiply and simplify, if possible. [14.1]

59) $\dfrac{6p - 6}{5p^2 + 6p + 1} \cdot \dfrac{4p + 4}{8 - 8p}$

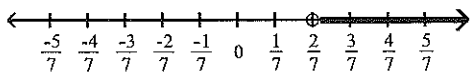
Divide and simplify, if possible. [14.2]

60) $\dfrac{z^2 - 4}{z^2 + 2z - 35} \div \dfrac{z^2 + 2z}{z^2 - 10z + 25}$

Answer Key
Testname: 0308.REVIEW.PROBLEMS.2007-2008

1) 540°
2) 126°
3) P = 92 m; A = 256 m^2
4) 70 ft; $217.00
5) $34\frac{2}{9}$ mi^2
6) 810 ft^2
7) 649 cm^2
8) C = 88 ft; A = 616 sq ft
9) P = 102.84 cm; A = 488.52 cm^2
10) Volume = 112 yd^3
Surface Area = 172 yd^2
11) 7392 mm^3
12) $m\angle 2 = m\angle 4 = m\angle 6 = 45°$, $m\angle 1 = m\angle 3 = m\angle 5 = m\angle 7 = 135°$
13) ASA
14) 65 ft
15) 5
16) Undefined
17) 137
18) 12
19) 32
20) 7
21) 45
22) 1
23) h = 6N – f – x
24) a) 16%
b) $29
25) 23
26) 24 m
27) 28°, 84°, 68°
28) $\{n \mid n \geq -3\}$

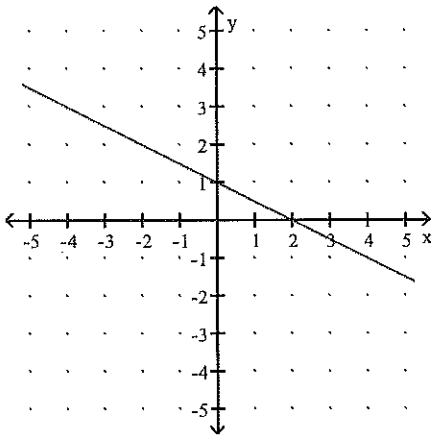
29) $\left\{x \mid x > \frac{2}{7}\right\}$



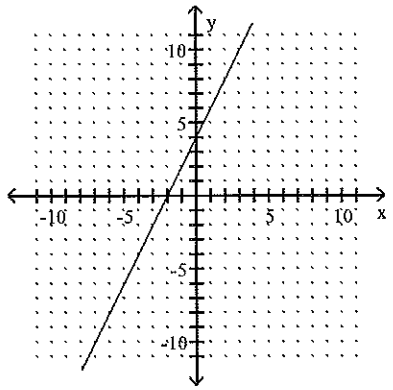
30) At least 63

Answer Key
Testname: 0308.REVIEW.PROBLEMS.2007-2008

31)



32)



33) $\frac{1}{2y^2}$

34) $-\frac{3x^2}{y^9}$

35) $\frac{8q^{15}}{p^{11}}$

36) $\frac{81v^{16}}{p^{12}s^8}$

37) $\frac{25}{4y^6}$

38) 6.0112×10^{-5}

39) 4.0×10^2; 400

40) 3.2×10^{13}

41) -44

42) $5m^8 + 8m^6 - 9m^2$

43) 1, 2, 0, 3; 3

44) $3x^2y - 11xy^2 - 6xy$

45) $90x^{10} - 20x^9 + 50x^3$

46) $64p^3 - 1$

47) $5x^2 - 27x + 36$

48) $81m^2 + 36m + 4$

49) $x^4 - 13x^2$

50) $-6x^5 + 3x^3 + 5$

51) $7m^3 - 2m^2n^4 + 3mn^6$

52) $12x^4y^2(4x^5y^7 + y^2 - 5x^2)$

53) $(3 - x)(2 - y)$

54) $4x(x - 3)(x + 4)$

55) $(x^2 + 1)(x + 1)(x - 1)$

56) $(2x + 5)(x - 3)$

57) $(x - 9y)^2$

58) $\frac{1}{3x + 5}$

59) $\frac{-3}{5p + 1}$

60) $\frac{(z - 2)(z - 5)}{z(z + 7)}$

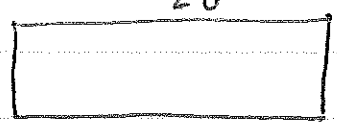
Detailed Solutions
To "Math 0308 Review Problems"

1) Pentagon ⟶ 5 sides.
Sum of the interior angles = $(n-2)180$
Replace n with 5.
$(5-2)\,180^\circ = 540^\circ$ ✓

2) Sum of the angles in any triangle = 180°.
$29^\circ + 25^\circ = 54^\circ$
$180^\circ - 54^\circ = 126^\circ$ ✓

3) Perimeter = Distance around the figure.
$P = 29m + 14m + 35m + 14m = 92m$
Area of a Trapezoid = $\frac{1}{2}(b_1 + b_2)h$
$= \frac{1}{2}(29+35)8$ Do parenthesis first.
$\frac{1}{2}(64)8$ Multiply the numerators.
$= \frac{512}{2} = 256\ m^2$ ✓

4)



fence ⟹ Perimeter = $20' + 15' + 20' + 15'$
$= 70$ feet.
Cost = $70 \times 3.10 = \$217$

5, Area of a rectangle = $l \times w$

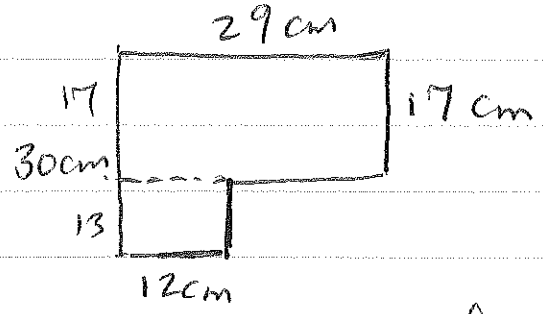
$= 7\frac{1}{3} \times 4\frac{2}{3} = \frac{22}{3} \times \frac{14}{3} = \frac{308}{9}$

$= 34\frac{2}{9}\ mi^2$ ✓

6, Area of a triangle = $\frac{\text{base} \times \text{height}}{2}$

$= \frac{36 \times 45}{2} = \frac{1620}{2} = 810\ ft^2$. ✓

7,



Break down the figure into 2 rectangles.

1st rectangle area = 17×29

$= 493\ cm^2$.

2nd rectangle area = $13 \times 12 = 156\ cm^2$.

Add both areas.

$493 + 156 = 649\ cm^2$ ✓

8, $C = 2\pi r$

$C = 2 \times \frac{22}{7} \times 14$

Reduce the 14 & 7. by dividing both sides by 7.

$C = 2 \times 22 \times 2 = 88$ ft ✓

$\text{Area} = \pi r^2 = \frac{22}{7} \times 14 \times 14$

$= \frac{22}{7} \times \frac{\cancel{14}^{2}}{1} \times \frac{14}{1} = 616$ ✓

9, Perimeter = Distance around the figure.

$= 12 + 36 + 36 + \frac{1}{2}$ the circumference

$= 84 + 3.14 \times 6$

$= 102.84$.

Area = Area of the rectangle + $\frac{1}{2}$ the circle.

$= 12 \times 36 + \frac{1}{2}(\pi r^2)$

$= 12 \times 36 + \frac{1}{2} \times 3.14 \times 6^2 = 488.52$ ✓

10, Volume = $l \times w \times h$

$= 2 \times 7 \times 8 = 112\ yd^3$ ✓

Surface area = $2lw + 2lh + 2wh$

$= 2 \times 2 \times 7 + 2 \times 2 \times 8 + 2 \times 7 \times 8$

$= 172\ yd^2$ ✓

11, Volume of a cone = $\frac{1}{3} \pi r^2 h$

$V = \frac{1}{3} \times \frac{22}{7} \times 12 \times 12 \times 49$

Reduce the 49 & 7 and the 3 & 12.

$V = \frac{1}{\cancel{3}_1} \times \frac{22}{\cancel{7}_1} \times \frac{\cancel{12}^4}{1} \times \frac{12}{1} \times \frac{\cancel{49}^7}{1}$

$V = 7392\ mm^3$ ✓

12, $m\angle 8 = 45^\circ \longrightarrow$ all acute angles $= 45^\circ$ and all obtuse angles $= 180^\circ - 45^\circ = 135^\circ$.

Therefore: $m\angle 4 = 45^\circ$

$m\angle 5 = 135^\circ$

$m\angle 3 = 135^\circ$

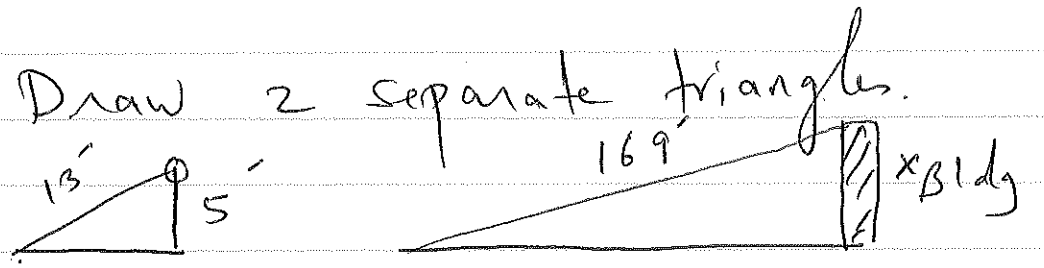
$m\angle 6 = 45^\circ$

$m\angle 2 = 45^\circ$

$m\angle 7 = 135^\circ$
$m\angle 1 = 135^\circ$.

13, Angle Side Angle = Angle Side Angle or
ASA = ASA.

14, Draw 2 separate triangles.



$\frac{13}{169} = \frac{5}{x}$. Cross multiply:

$13x = 845$. Divide both sides by 13.

$x = 65'$ ✓

15, $3 + (-8) - 16 - (-11) + 15$

- solution -

Replace $-$ followed by $-$ with $+$.

$3 + (-8) - 16 + 11 + 15$

$-5 - 16 + 11 + 15$

$-21 + 11 + 15$

$-10 + 15 = 5$ ✓

16, $\frac{35}{-14+14} = \frac{35}{0}$ = undefined.

17) $5\left[-6+3^2-5(2-4)\right]+|8(-9)|$

– Solution –

Use order of operations: PEMDAS

$5\left[-6+9-5(-2)\right]+|-72|$

$= 5\left[-6+9+10\right]+72$

$= 5\left[13\right]+72 = 65+72 = 137$ ✓

18) $\dfrac{-8^2-18\div 3+5\cdot 2}{2-7}$

Use order of operations:

$\dfrac{-64-6+10}{-5} = \dfrac{-70+10}{-5} = \dfrac{-60}{-5} = 12$ ✓

19) Solve.

$\frac{3}{4}x = 24$

Make 24 a fraction by making it over 1

$\frac{3}{4}x = \frac{24}{1}$

Cross multiply:

$3x = 96$ Divide by 3.

$x = 32$ ✓

20, $-3.8q = -16.8 - 1.4q$

- Solution -

$-3.8q = -16.8 - 1.4q$

$+1.4q \qquad +1.4q$

$-2.4q = -16.8$

Divide both sides by -2.4

$q = \frac{-16.8}{-2.4} = 7$ ✓

21, $\frac{2x}{5} - \frac{x}{3} = 3$

- solution -

Multiply the 2 denominators $5 \times 3 = 15$.

Multiply each term by 15.

$15 \cdot \frac{2x}{5} - 15 \cdot \frac{x}{3} = 15(3)$

$6x - 5x = 45$

$x = 45$ ✓

22, $-5x + 6(3x - 6) = -15 - 8x$

- solution -

Distribute first:

$-5x + 18x - 36 = -15 - 8x$

Combine like Terms:

$13x - 36 = -15 - 8x$. Add $8x$ to both sides

$21x - 36 = -15$

$+36 \quad +36$

$21x = 21 \Rightarrow x = 1$ ✓

23, $N = \frac{f + h + x}{6}$ for h

- solution -

cross multiply:

$6N = f + h + x$. Move f and x to the other side by changing the signs

$6N - f - x = h$ ✓

24, a, Percent = $\frac{\text{Part}}{\text{Whole}} \times 100$

$= \frac{4}{25} \times 100 = \frac{400}{25} = 16\%$.

b, Total cost = $\$25 + \$4 = \$29$.

25, Let the integers be: $X, X+2, X+4$.

$X + X + 4 = 5(X+2) - 63$

$2X + 4 = 5X + 10 - 63$

$2X + 4 = 5X - 53$. Add 53 to both sides.

$2X + 57 = 5X$. Subtract $2x$ from both sides.

$57 = 3X$

$X = 19$ (1^{st} integer)

third consecutive odd is 23 ✓

26, $L = 7 + W$.

$P = 2L + 2W$

$82 = 2(7+W) + 2W$

$82 = 14 + 2W + 2W$

$82 = 14 + 4W$ Subtract 14 from both sides

$68 = 4W$ $\Rightarrow W = 17$. $L = 17 + 7 = 24$ ✓

27) 2^{nd} angle $= 3 \times 1^{st}$

3^{rd} angle $= 40^\circ + 1^{st}$.

We know that:

$1^{st} + 2^{nd} + 3^{nd} = 180^\circ$

$1^{st} + 3 \times 1^{st} + 40^\circ + 1^{st} = 180^\circ$

$5 \times 1^{st} + 40 = 180^\circ$

$5 \times 1^{st} = 140^\circ \longrightarrow 1^{st} = 28^\circ$ ✓

$2^{nd} = 3 \times 1^{st} = 3 \times 28^\circ = 84^\circ$ ✓

$3^{nd} = 40^\circ + 1^{st} = 40^\circ + 28^\circ = 68^\circ$ ✓

28) Solve. $11n - 11 \leq 13n - 5$

– solution –

Subtract $13n$ from both sides:

$-2n - 11 \leq -5$

Add 11 to both sides:

$-2n \leq 6$. Divide by -2.

$\frac{-2n}{-2} \leq \frac{6}{-2}$

$n \geq -3$ ✓

29, $\frac{-4}{7} > -2x$

– solution –

Take opposite of both sides.

$\frac{4}{7} < 2x$. Swap the terms.

$2x > \frac{4}{7}$. Cross multiply

$14x > 4 \Longrightarrow x > \frac{4}{14}$ or $x > \frac{2}{7}$ ✓

30, If he wants to have an average of 85. All 3 test grades have to be 85. Total = 85+85+85

= 255

The sum of the 2 tests = 99+93 = 192

Third test score should be = 255 – 192

= 63.

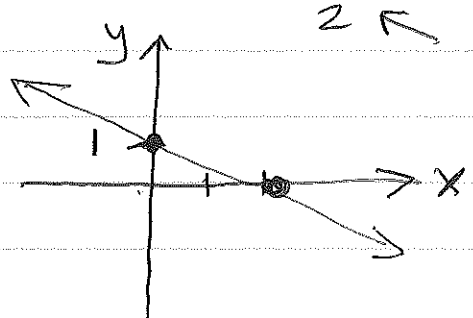
He should score at least 63.

31, Graph. $y = \frac{-1}{2}x + 1$

– solution –

b = 1, $m = \frac{-1}{2}$ ← Rise

← Run



32) Graph: $3y - 6x = 12$

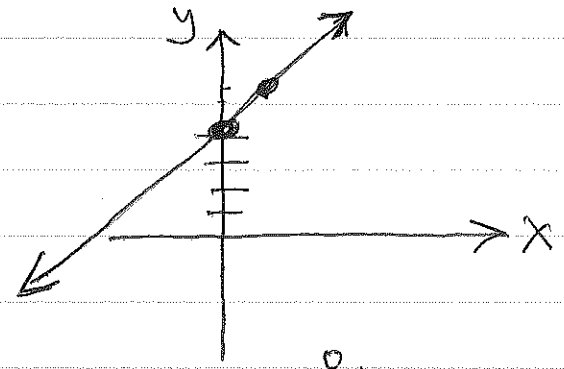
– Solution –

Solve for y first:

$3y = 12 + 6x$ Divide each term by 3.

$y = 4 + 2x$

$\Rightarrow b = 4, \quad m = \frac{2}{1}$ ← Rise, ← Run



33) Simplify: $\frac{2x^0y}{4^1y^3}$

– Solution –

$x^0 = 1$ & $4^1 = 4$.

$\frac{2y}{4y^3} = \frac{2\cancel{y}}{4 \cdot y \cdot y \cdot \cancel{y}} = \frac{1}{2y^2}$ ✓

34) Simplify: $\frac{-24x^8y^{-7}}{8x^6y^2}$

– Solution –

Divide −24 by 8, you get −3.

When you divide, you subtract the exponents.

$-3x^2y^{-9} \quad \cdot \quad y^{-9} = \frac{1}{y^9}$

Answer is $\frac{-3x^2}{y^9}$ ✓

35, Simplify: $(2p^{-3}q^4)^3(p^{-2}q^3)$

- Solution -

Use the rule $(x^a)^b = x^{ab}$

$(2^3 p^{-9} q^{12})(p^{-2}q^3)$

$= 8p^{-11}q^{15}$ but $p^{-11} = \frac{1}{p^{11}}$

$= \frac{8q^{15}}{p^{11}}$ ✓

36) Simplify: $\left(\frac{3p^{-3}v^4}{s^2}\right)^4$

– Solution –

Use the rule: $(x^a)^b = x^{ab}$

$= \frac{3^4 p^{-12} v^{16}}{s^8} = \frac{81 p^{-12} v^{16}}{s^8}$

but $p^{-12} = \frac{1}{p^{12}}$

$= \frac{81 v^{16}}{p^{12} s^8}$ ✓

37) Simplify: $\left(\frac{-2y^3}{5}\right)^{-2}$

– Solution –

Use the rule: $(x^a)^b = x^{ab}$

$= \frac{(-2)^{-2} y^{-6}}{5^{-2}}$. Since they all have negative exponents, swap their locations, and change the exponent signs.

$\frac{5^2}{(-2)^2 y^6} = \frac{25}{4y^6}$ ✓

38, Write: .0 0 0 0 6 0 1 1 2 in Scientific Notation.

– Solution –

Move the decimal from left to right and place it so that the number becomes between 1 and 10.

6.0112×10^{-5} (answer) ✓

39, Write in Scientific Notation:

$$\frac{8.4 \times 10^{-1}}{2.1 \times 10^{-3}}$$

– Solution –

Divide 8.4 by 2.1, you get 4. When you divide 10^{-1} by 10^{-3} you subtract the exponents.

4×10^{2} ✓

40, Write in Scientific Notation:

$(4 \times 10^{5})(8 \times 10^{7})$

– Solution –

$4 \times 8 = 32$.

$10^{5} \times 10^{7} = 10^{12}$

Answer is 32×10^{12} but 32 is not between 1 and 10.

3.2×10^{13} ✓

41) Evaluate $-6x^2 + 6x - 8$ for $x = -2$

– Solution –

Replace x with -2 in parenthesis:

$$-6(-2)^2 + 6(-2) - 8$$

$$= -6(4) - 12 - 8$$

$$= -24 - 12 - 8 = -36 - 8 = -44$$ ✓

42) Collect like Terms and write in descending order:

$$-10m^8 + 14m^6 - 9m^2 + 15m^8 - 6m^6$$

– Solution –

place like Terms together:

$$-10m^8 + 15m^8 + 14m^6 - 6m^6 - 9m^2$$

$$= 5m^8 + 8m^6 - 9m^2$$ ✓

43) Identify the degree of each term and the degree of the Polynomial:

$$7x - 8x^2 + 9 - 5x^3$$

– Solution –

$7x \Rightarrow$ Power is 1 $\Rightarrow$ degree = 1

$8x^2 \Rightarrow$ degree = 2.

$9 \Rightarrow$ degree = 0

$5x^3 \Rightarrow$ degree = 3. (degree of Polynomial)

44, Add or Subtract:

$$(6x^2y - 2xy) - (3x^2y + 5xy^2) - (4xy + 6xy^2)$$

- Solution -

Change the signs of the terms that follow the subtraction.

$$\underbrace{6x^2y} - \underbrace{2xy} - \underbrace{3x^2y} - \underbrace{5xy^2} - \underbrace{4xy} - \underbrace{6xy^2}$$

Combine like terms

$$= 3x^2y - 6xy - 11xy^2 \checkmark$$

45, Find the Product:

$$-10x^3(-9x^7 + 2x^6 - 5)$$

- Solution -

multiply $-10x^3$ by each term inside parenthesis.

$$90x^{10} - 20x^9 + 50x^3 \checkmark$$

46, $(4p-1)(16p^2+4p+1)$

- solution -

multiply $4p(16p^2+4p+1)$ 1st

$= 64p^3+16p^2+4p$

multiply -1 by $16p^2+4p+1$

$= -16p^2-4p-1$

Combine the results.

$64p^3+16p^2+4p-16p^2-4p-1$

$= 64p^3-1$ ✓

47, $(-3+x)(5x-12)$

- solution -

multiply: $-3(5x-12)$ first

$-15x+36$.

multiply $+x(5x-12) = 5x^2-12x$

Combine the results:

$-15x+36+5x^2-12x$

$= 5x^2-27x+36$ ✓

48, $(9m+2)^2$

- solution -

Rewrite: $(9m+2)^2$ as $(9m+2)(9m+2)$

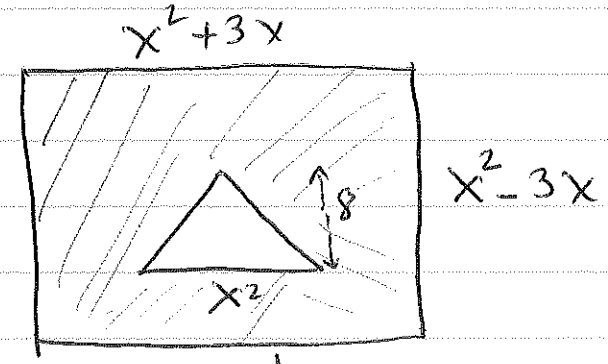
$9m(9m+2) = 81m^2+18m$.

$2(9m+2) = 18m+4$.

Combine the results:

$81m^2 + 18m + 18m + 4 =$
$81m^2 + 36m + 4$ ✓

49,



- solution -

Area of shaded region =
area of the rectangle − area of triangle.

Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times x^2 \times 8$
$= 4x^2$.

Area of the rectangle $= l \times w$

$= (x^2+3x)(x^2-3x)$

$x^2(x^2-3x)$
$= x^4 - 3x^3$
$+3x(x^2-3x) = 3x^3 - 9x^2$

Combine the results:
$x^4 - 3x^3 + 3x^3 - 9x^2 = x^4 - 9x^2$

Area of the rectangle − Area of triangle =
$(x^4 - 9x^2) - 4x^2 = x^4 - 13x^2$ ✓

50) Divide: $(12x^8 - 6x^6 - 10x^3) \div (-2x^3)$

- Solution -

Divide each term by $-2x^3$.

$$\frac{12x^8}{-2x^3} \quad \frac{-6x^6}{-2x^3} \quad \frac{-10x^3}{-2x^3}$$

$$= -6x^5 + 3x^3 + 5 \checkmark$$

51) Divide: $\dfrac{42m^5n - 12m^4n^5 + 18m^3n^7}{6m^2n}$

Divide each term by $6m^2n$:

$$\frac{42m^5n}{6m^2n} - \frac{12m^4n^5}{6m^2n} + \frac{18m^3n^7}{6m^2n}$$

$$= 7m^3 - 2m^2n^4 + 3mn^6 \checkmark$$

52) Factor out the greatest common factor:

$$48x^9y^9 + 12x^4y^4 - 60x^6y^2$$

The common factor between the numbers is 12

The smallest exponent for x is x^4.

" " " = y is y^2.

Therefore the greatest common factor is $12x^4y^2$.

$12x^4y^2(4x^5y^7 + y^2 - 5x^2)$ ✓

53, Factor by Grouping:

$6 - 2x - 3y + xy$

– Solution –

Group first:

$(6 - 2x) - (3y - xy)$

Take the common factor,

$2(3 - x) - y(3 - x)$.

Take $(3 - x)$ as a common factor:

$(3 - x)(2 - y)$ ✓

54, Factor completely.

$4x^3 + 4x^2 - 48x$

– Solution –

Take $4x$ as a common factor:

$4x(x^2 + x - 12)$.

Factor $x^2 + x - 12 = (x + 4)(x - 3)$

Answer is: $4x(x + 4)(x - 3)$ ✓

55, Factor Completely: $x^4 - 1$

– Solution –

This is a difference of 2 squares.

$(x^2 + 1)(x^2 - 1)$

Factor $x^2 - 1$ again: $(x + 1)(x - 1)$

Answer is: $(x^2 + 1)(x + 1)(x - 1)$ ✓

56) Factor: $2x^2 - x - 15$

- Solution -

Multiply 2 by -15 $= -30$

Product $= -30$; Sum $= -1$.

The numbers are -6 and $+5$.

$(2x - 6)(2x + 5)$

Divide the 1st term by 2.

$(x - 3)(2x + 5)$ ✓

57) $x^2 - 18xy + 81y^2$

- Solution -

Get 2 numbers: product $= 81y^2$

Sum $= -18y$.

They are $-9y$ and $-9y$.

Answer is:

$(x - 9y)(x - 9y)$ ✓

58) Simplify. $\dfrac{2x+2}{6x^2+16x+10}$

Factor the numerator: $2(x+1)$

Factor the denominator: $2(3x^2 + 8x + 5)$

$= 2(3x+5)(x+1)$

$= \dfrac{2(x+1)}{2(3x+5)(x+1)} = \dfrac{1}{3x+5}$ ✓

59, Multiply and simplify:

$$\frac{6p-6}{5p^2+6p+1} \cdot \frac{4p+4}{8-8p}$$

Factor each term first:

$6p-6 = 6(p-1)$

$5p^2+6p+1 = (5p+1)(p+1)$.

$4p+4 = 4(p+1)$

$8-8p = 8(1-p)$.

Replace the answers back in the problem:

$$\frac{6(p-1)}{(5p+1)(p+1)} \cdot \frac{4(p+1)}{8(1-p)}$$

Note $1-p = -(p-1)$.

$$= \frac{-24(p-1)(p+1)}{(5p+1)(p+1)(p-1)} = \frac{-24}{5p+1}$$ ✓

60, Divide: $\dfrac{z^2-4}{z^2+2z-35} \div \dfrac{z^2+2z}{z^2-10z+25}$

- Solution -

Factor each term: $z^2-4 = (z+2)(z-2)$.

$z^2+2z-35 = (z+7)(z-5)$

$z^2+2z = z(z+2)$

$z^2-10z+25 = (z-5)(z-5)$

Replace the answers back in the problem:

$$\frac{(z+2)(z-2)}{(z+7)(z-5)} \cdot \frac{(z-5)(z-5)}{z(z+2)} = \frac{(z-2)(z-5)}{z(z+7)}$$ ✓