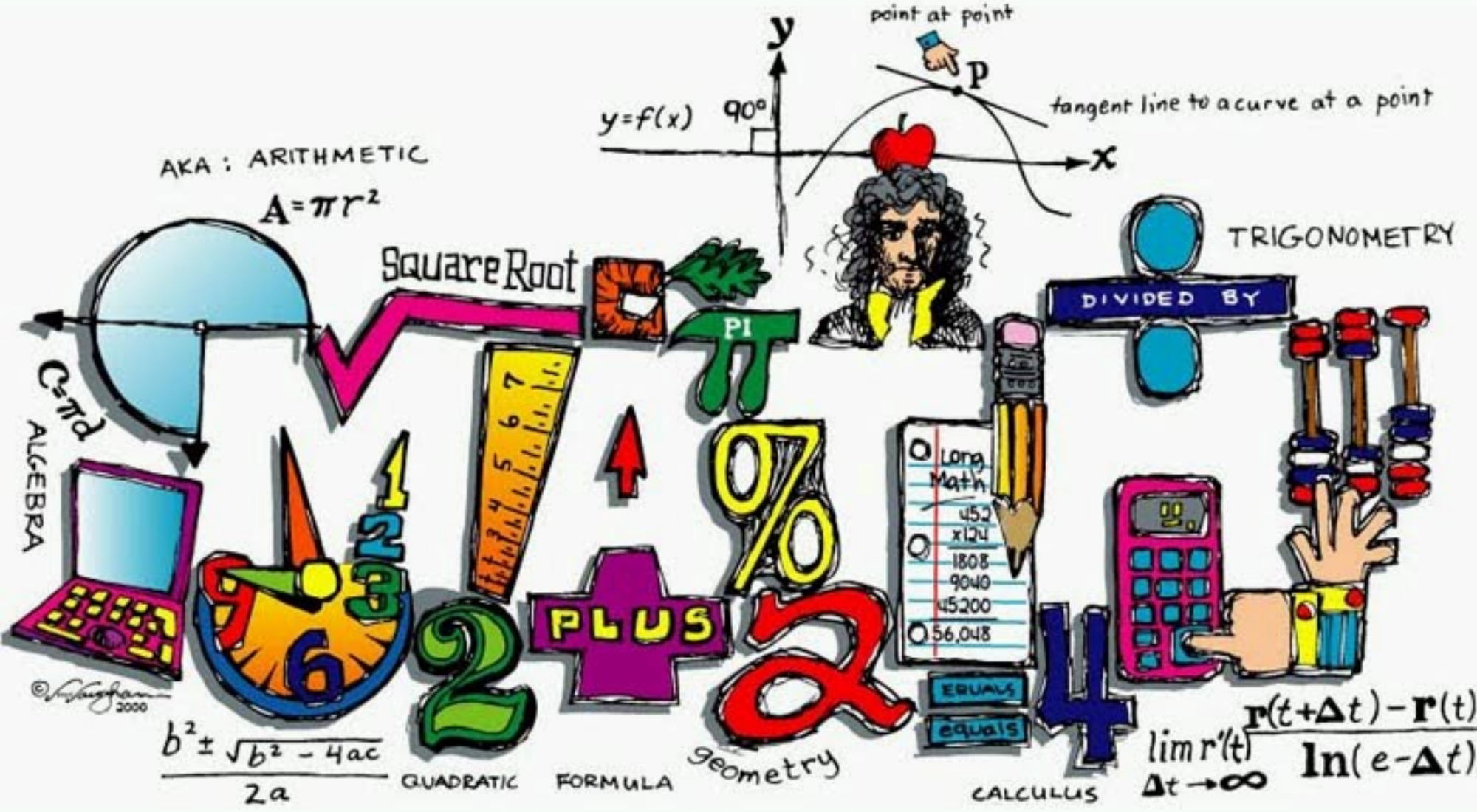

point at point
P
y
x
y=f(x)
90°
tangent line to a curve at a point
AKA : ARITHMETIC
A=πr²
Square Root
PI
TRIGONOMETRY
DIVIDED BY
C=πd
ALGEBRA
Long Math
452
x124
1808
9040
45200
56,048
PLUS
EQUALS
equals
©2000
b² ± √b² - 4ac / 2a
QUADRATIC FORMULA
geometry
CALCULUS
lim r'(t) Δt→∞
r(t+Δt) - r(t) / ln(e-Δt)

Precalculus Math II
Review of Sequences, Series and Radicals

CUMULATIVE REVIEW Chapters 1-2

1

1. a) i) Determine this sum:
$-5.5 - 2 + 1.5 + 5 + 8.5 + 12 + 15.5$

ii) For the arithmetic series in part i, determine the value of t_{18}.

b) i) Determine the sum of the first 16 terms of this arithmetic series: $17 + 11 + 5 - 1 - 7 - 13 - \ldots$

ii) For the series in part i, which term has the value -121?

2. Write the first 5 terms of each geometric sequence.

a) Each term is a power of 3.

b) Each term is a negative integer.

c) $t_5 = 32$

3. From 2000 to 2008, the amount of electricity supplied by wind energy in Canada increased by about 40% annually. Wind energy in 2008 produced enough electricity to supply about 716 000 homes. To the nearest thousand, about how many homes might be supplied by wind energy in 2018? Explain your reasoning and identify any assumptions you made.

4. Identify whether each infinite geometric series converges. Determine the sum of each series that converges.

a) $0.7 - 0.07 + 0.007 - 0.0007 + \ldots$

b) $-4 - 3 - \frac{9}{4} - \frac{27}{16} - \ldots$

2

5. Evaluate.

a) $\dfrac{|(-2) - (-8)|}{|(-9) + (-3)|}$

b) $\frac{1}{2}\left|1\frac{1}{4} - 2\frac{1}{8}\right| - \left|-9\frac{1}{3} + 7\frac{2}{3}\right|$

6. Simplify each radical, and state the values of the variables for which the radical is defined.

a) $\sqrt{63x^3}$

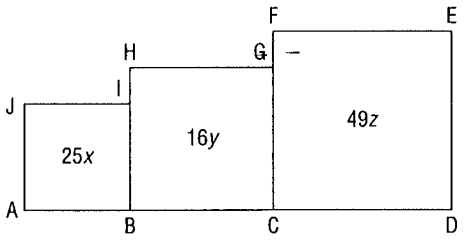
b) $\sqrt[3]{-54y^7}$

7. Simplify.

a) $2n\sqrt{5m} - n\sqrt[3]{4m} - 4n\sqrt{5m} + 5n\sqrt[3]{4m}, m \geq 0, n \in \mathbb{R}$

b) $4\sqrt{v^7w^2} - 3\sqrt{v^4w^5} - 6\sqrt{v^7w^2} + 7\sqrt{v^4w^5}, v, w \geq 0$

8. Three squares, with areas shown below, have adjacent sides touching. Determine the perimeter of the shape they form.



9. Simplify.

a) $(6 + \sqrt{3})(4 - \sqrt{3}) - \sqrt{3}(2 - \sqrt{3})$

b) $(\sqrt{m} + 3\sqrt{n})^2 - (2\sqrt{m} - 5\sqrt{n})(2\sqrt{m} + 5\sqrt{n})$

c) $\dfrac{15\sqrt{2} + 5\sqrt{3}}{\sqrt{20}}$

d) $\dfrac{4\sqrt{7} - 3\sqrt{2}}{5\sqrt{2} + 2\sqrt{7}}$

10. Solve each equation. Verify the solution.

a) $4 - 5\sqrt{6x} = -5 - 4\sqrt{6x}$ b) $\sqrt{x} + 14 = 3\sqrt{x} + 10$

ANSWERS

1. a) i) 35 ii) 54 b) i) -448 ii) t_{24} **3.** 20 711 000 **4.** a) $0.\overline{63}$ b) -16
5. a) $\frac{1}{2}$ b) $-\frac{59}{48}$, or $-1\frac{11}{48}$ **6.** a) $3x\sqrt{7x}, x \geq 0$ b) $-3y^2\sqrt[3]{2y}, y \in \mathbb{R}$
7. a) $-2n\sqrt{5m} + 4n\sqrt[3]{4m}$ b) $-2v^3w\sqrt{v} + 4v^2w^2\sqrt{w}$ **8.** $10\sqrt{x} + 8\sqrt{y} + 28\sqrt{z}$
9. a) $24 - 4\sqrt{3}$ b) $-3m + 6\sqrt{mn} + 34n$ c) $\dfrac{3\sqrt{10} + \sqrt{15}}{2}$ d) $\dfrac{13\sqrt{14} - 43}{11}$
10. a) no solution b) 4

Precalculus Math 11
Review of Sequences and Series

PRACTICE TEST

1. Multiple Choice What is the sum of the first 30 terms of this arithmetic series? $-5 - 2 + 1 + 4 + \ldots$

A. 1152 **B.** 1155 **C.** 1158 **D.** 1161

2. Multiple Choice What is the sum of the first 10 terms of this geometric series? $-12\,800 + 6400 - 3200 + 1600 - \ldots$

A. 8525 **B.** −8525 **C.** −8537.5 **D.** 8537.5

3. a) Which sequence below appears to be arithmetic? Justify your answer.

i) 4, −10, 16, −22, 28, . . . **ii)** 4, −10, −24, −38, −52, . . .

b) Assume that the sequence you identified in part a is arithmetic. Determine:

i) a rule for t_n **ii)** t_{17}

iii) the term that has value −332

4. For a geometric sequence, $t_4 = -1000$ and $t_7 = 1$; determine:

a) t_1

b) the term with value 0.0001

5. a) For the infinite geometric series below, identify which series converges and which series diverges. Justify your answer.

i) $100 - 150 + 225 - 337.5 + \ldots$

ii) $10 + 5 + 2.5 + 1.25 + \ldots$

b) For which series in part a can you determine its sum? Explain why, then determine this sum.

6. This sequence represents the approximate lengths in centimetres of a spring that is stretched by loading it with from one to four 5-kg masses: 50, 54, 58, 62, . . .
Suppose the pattern in the sequence continues. What will the length of the spring be when it is loaded with ten 5-kg masses? Explain how you found out.

7. As part of his exercise routine, Earl uses a program designed to help him eventually do 100 consecutive push-ups. He started with 17 push-ups in week 1 and planned to increase the number of push-ups by 2 each week.

a) In which week does Earl expect to reach his goal?

b) What is the total number of push-ups he will have done when he reaches his goal? Explain how you know.

ANSWERS

1. B **2.** B **3. a) i)** not arithmetic **ii)** arithmetic **b) i)** $t_n = 4 - 14(n - 1)$ **ii)** -220 **iii)** t_{25} **4. a)** 1 000 000 **b)** t_{11} **5. a) i)** diverges **ii)** converges **b)** 20 **6.** 86 cm **7. a)** week 43 **b)** 2537

Precalculus Math 11
Radicals Review

PRACTICE TEST

1. Multiple Choice Which statement is false?

A. $|x| = \sqrt{x^2}$ for $x \in \mathbb{R}$

B. $x = \sqrt{x^2}$ for $x \geq 0$

C. $|x| = \sqrt[3]{x^3}$ for $x \in \mathbb{R}$

D. $x = \sqrt[3]{x^3}$ for $x \geq 0$

2. Multiple Choice Which is the correct simplification of $\sqrt{12x^3}$?

A. $2\sqrt{3x^3}, x \geq 0$

B. $2x\sqrt{3x}, x \in \mathbb{R}$

C. $2x\sqrt{3x}, x \geq 0$

D. $2|x|\sqrt{3x}, x \in \mathbb{R}$

3. Simplify.

a) $\sqrt{72} - 5\sqrt{2} + 3\sqrt{8}$ **b)** $(\sqrt{3} - \sqrt{5})(\sqrt{3} + \sqrt{5})$

c) $(2\sqrt{6} + 3\sqrt{5})^2$ **d)** $\dfrac{1}{\sqrt{7} - \sqrt{3}}$

4. Identify the values of the variable for which each radical is defined where necessary, then simplify.

a) $(\sqrt{x} + 2)(\sqrt{x} - 3)$ **b)** $6\sqrt{a^2} + 2a$

c) $\frac{8\sqrt{2}}{\sqrt{12} - \sqrt{10}}$

d) $\frac{2\sqrt{10} - \sqrt{3}}{\sqrt{10} + \sqrt{3}}$

5. Which equations have real roots? If the root is real, determine its value. If the equation has no real roots, explain how you know.

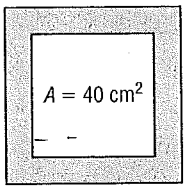
a) $\sqrt{2x + 3} = 3$

b) $\sqrt{5x - 1} = \sqrt{2x + 5}$

c) $\sqrt{3x + 2} + 5 = 2$

d) $2\sqrt{x - 8} = 3\sqrt{x + 2}$

6. To make a picture frame, a square with area 40 cm^2 is cut from a square with area 90 cm^2. Serena wants to put a thin gold ribbon around the inside and outside edges of the frame. How much ribbon does Serena need?



7. The formula $t = \sqrt{\frac{2d}{9.8}}$ gives the time, t seconds, for an object at rest to fall d metres. It took 2.5 s for a ball dropped from a roof to hit the ground. To the nearest metre, from what height was the ball dropped?

ANSWERS

1. C **2.** C **3. a)** $7\sqrt{2}$ **b)** -2 **c)** $69 + 12\sqrt{30}$ **d)** $\frac{\sqrt{7} + \sqrt{3}}{4}$

4. a) $x - \sqrt{x} - 6, x \geq 0$ **b)** $6|a| + 2a, a \in \mathbb{R}$ **c)** $8\sqrt{6} + 8\sqrt{5}$ **d)** $\frac{23 - 3\sqrt{30}}{7}$

5. a) $x = 3$ **b)** $x = 2$ **c)** no real roots **d)** no real roots **6.** $20\sqrt{10}$ cm **7.** 31 m

Precalculus Math 11
Trigonometry Review

PRACTICE TEST

1. Multiple Choice The terminal arm of an angle θ in standard position is in Quadrant 4. Which statements are true?

I. $\tan\theta < 0$ **II.** $\tan\theta > 0$ **III.** $\sin\theta < \cos\theta$ **IV.** $\sin\theta > \cos\theta$

A. I and III **B.** I and IV **C.** II and III **D.** II and IV

2. Multiple Choice The terminal arm of an angle θ is in standard position, with $\sin\theta = \frac{1}{5}$. Which statement could be true?

A. $\cos\theta = \frac{4}{5}$ **B.** $\cos\theta = \frac{2\sqrt{6}}{5}$ **C.** $\cos\theta = \frac{\sqrt{26}}{5}$ **D.** $\cos\theta = \frac{2}{5}$

3. Point P(−2, 7) is on the terminal arm of an angle θ in standard position.

a) Determine $\sin\theta$, $\cos\theta$, and $\tan\theta$.

b) Determine the measure of θ to the nearest degree.

4. Without using a calculator, determine the exact value of each expression.

a) $(\sin 45°)(\cos 45°)$ b) $\frac{\tan 45°}{\cos 60°}$

c) $(\tan 120°)(\tan 210°)$ d) $\sin 330° + \cos 120°$

5. For which angles in standard position are the following statements true? Give the angle measures to the nearest degree for $0° \leq \theta \leq 360°$.

a) $\sin\theta = -\frac{1}{\sqrt{2}}$ b) $\cos\theta = \frac{3}{4}$

6. Solve each triangle. Give the angle measures to the nearest degree and the side lengths to the nearest tenth of a unit.

a) In ΔABC, AB = 20 m, $\angle A = 65°$, and $\angle B = 40°$

b) In ΔKMN KM = 25.0 m, MN = 24.6 m, $\angle K = 75°$

c) In ΔPQR, PQ = 15.0 cm, PR = 11.0 cm, and QR = 10.5 cm

7. A cross-country runner runs due east for 6 km, then changes course to E25°N and runs another 9 km. To the nearest tenth of a kilometre, how far is the runner from her starting point?

8. In parallelogram BCDE, BC = 10 cm, CD = 15 cm, and $\angle B = 135°$; determine the lengths of the diagonals to the nearest tenth of a centimetre.

ANSWERS

1. A **2.** B **3. a)** $\sin\theta = \frac{7}{\sqrt{53}}$, $\cos\theta = -\frac{2}{\sqrt{53}}$, $\tan\theta = -3.5$ **b)** 106°

4. a) $\frac{1}{2}$ **b)** 2 **c)** −1 **d)** −1 **5. a)** 225°, 315° **b)** 41°, 319°

6. a) $\angle C = 75°$, BC ≐ 18.8 m, AC ≐ 13.3 m

b) $\angle N \doteq 79°$ or 101°, $\angle M \doteq 26°$ or 4°, KN ≐ 11.2 m or 1.8 m

c) $\angle P \doteq 44°$, $\angle Q \doteq 47°$, $\angle R \doteq 88°$ **7.** 14.7 km **8.** 23.2 cm, 10.6 cm

Precalculus Math 11
Review of Factoring

REVIEW

3.1

1. Is $x - 5$ a factor of each trinomial? Justify your answer.

a) $3x^2 + 3x - 60$ **b)** $3x^2 - 13x - 10$

2. Factor.

a) $0.5x^2 - 0.4x - 1.2$ **b)** $3(x - 3)^2 + 2(x - 3) - 5$

3. Factor.

a) $81x^2 - 4y^2$

b) $49(x - 4)^2 - 9(5y - 2)^2$

3.2

4. Solve by factoring. Verify the solutions.

a) $20x^2 + 3x - 2 = 0$ **b)** $6x^2 - 21x + 18 = 0$

c) $(x - 5)(x + 8) = 14$ d) $6x^2 = 8x$

5. Two numbers have a sum of 20 and a product of 84. Use a quadratic equation to determine the numbers.

3.3

6. Solve each equation.

a) $(2x + 1)^2 + 4 = 49$ b) $-3 + (3 - 2x)^2 = 5$

7. Solve each equation by completing the square.

a) $x^2 + 4x + 2 = 0$ b) $3x^2 - 2x - 1 = 0$

3.4

8. Solve each quadratic equation.

a) $2x^2 - 6x + 1 = 0$ **b)** $(x + 1)(x + 2) = x$

9. A truck was travelling at 23 m/s. It decelerated for 15 s. The distance travelled by the truck, d metres, during this time is given by the formula $d = 23t - 0.6t^2$, where t is the time in seconds. How long did it take the truck to travel 60 m? Give the answer to the nearest tenth of a second.

3.5

10. Without solving, determine whether each equation has one, two, or no real roots.

a) $2x^2 - 1.8x - 1.25 = 0$ **b)** $-2x^2 + 3x - 10 = 0$

11. Consider the equation $8x^2 - 5x + k = 0$.
Determine the values of k in each case:

a) The equation has no real roots.

b) The equation has exactly one real root.

c) The equation has two real roots.

ANSWERS

1. a) no **b)** yes **2. a)** $0.1(5x + 6)(x - 2)$ **b)** $(3x - 4)(x - 4)$
3. a) $(9x - 2y)(9x + 2y)$ **b)** $(7x - 15y - 22)(7x + 15y - 34)$
4. a) $-\frac{2}{5}, \frac{1}{4}$ **b)** $\frac{3}{2}, 2$ **c)** $-9, 6$ **d)** $0, \frac{4}{3}$ **5.** 6, 14 **6. a)** $\frac{-1 \pm 3\sqrt{5}}{2}$ **b)** $\frac{3 \pm 2\sqrt{2}}{2}$
7. a) $-2 \pm \sqrt{2}$ **b)** $-\frac{1}{3}, 1$ **8. a)** $\frac{3 \pm \sqrt{7}}{2}$ **b)** no real roots **9.** 2.8 s
10. a) 2 **b)** 0 **11. a)** $k > \frac{25}{32}$ **b)** $k = \frac{25}{32}$ **c)** $k < \frac{25}{32}$