Review 1

June-08-16
11:23 AM

Foundations and Pre-Calculus Math 10 Review

NAME: _____

Chapter 1 (Measurement)

SI Measurement vs Imperial Measurement

"Metric"
Used in most countries

Used in USA

Referent

ex. width of pinky $\approx$ 1 cm

Unit Conversions

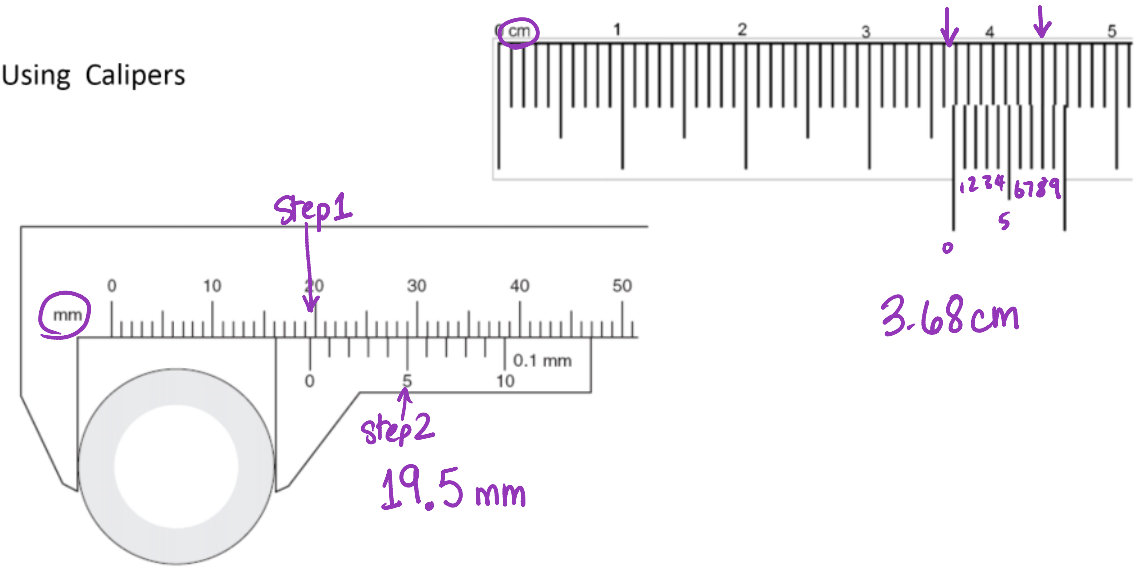
eg. Convert 10 inches into mm.

$$10 \text{ in.} \times \frac{2.54 \text{ cm}}{1 \text{ in.}} \times \frac{10 \text{ mm}}{1 \text{ cm}} = 254 \text{ mm}$$

eg. Convert 5 ft^2 into m^2.

$$5 \text{ ft}^2 \times \left(\frac{30.48 \text{ cm}}{1 \text{ ft}}\right)^2 \times \left(\frac{1 \text{ m}}{100 \text{ cm}}\right)^2 = 0.46 \text{ m}^2$$

Using Calipers



Chapter 2 (Surface Area and Volume)

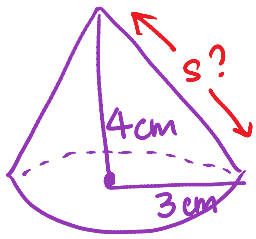
Unit Conversions - squared or cubed

eg. Convert $10\ cm^3$ into mm^3

$$10\ cm^3 \times \left(\frac{10\ mm}{1\ cm}\right)^3 = 10\,000\ mm^3$$

Surface Area

eg. Find S.A. of:



$3^2+4^2=s^2$

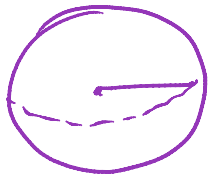
$s = 5cm$

$S.A. = \pi r^2 + \pi rs$

$= \pi(3)^2 + \pi(3)(5)$

$= 75.4\ cm^2$

eg. Given S.A. $= 105\ in^2$, find radius of the sphere.



$S.A = 4\pi r^2$

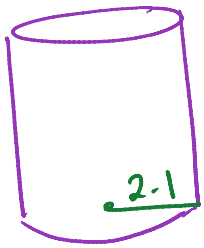
$\frac{105}{4\pi} = \frac{4\pi r^2}{4\pi}$

$8.35 = r^2$

$r = 2.9\ in$

Volume

eg. Calculate Volume given $d = 4.2\ cm$ and height $= 8\ cm$.



$V = (\text{area base}) \times h$

$= \pi r^2 \times h$

$= \pi(2.1)^2 \times 8$

$= 110.8\ cm^3$

eg. Given a rectangular prism with volume $216\ cm^3$, height of 8cm, length of 6cm, what is the width?

$V = W \times L \times H$

$216 = W \times 6 \times 8$

$\frac{216}{48} = \frac{48W}{48}$

width $= 4.5\ cm$

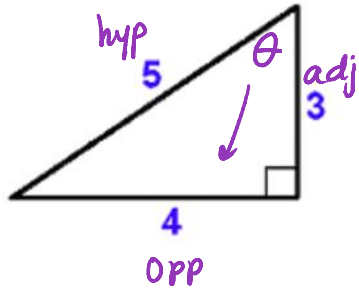
Chapter 3 (Right Triangle Trigonometry)

SOH CAH TOA

Tangent $\tan\theta = \frac{opp}{adj} = \frac{4}{3}$

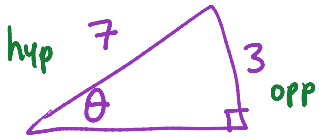
Sine $\sin\theta = \frac{opp}{hyp} = \frac{4}{5}$

Cosine $\cos\theta = \frac{adj}{hyp} = \frac{3}{5}$



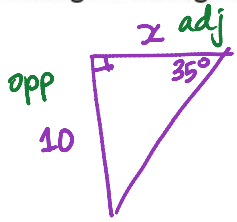
Ex) Finding a missing angle given 2 sides

* use $^{-1}$ to find angle



$\sin\theta = \frac{3}{7} \rightarrow \theta = \sin^{-1}\left(\frac{3}{7}\right) = 23.4^\circ$

Ex) Finding a missing side given 1 side and 1 angle

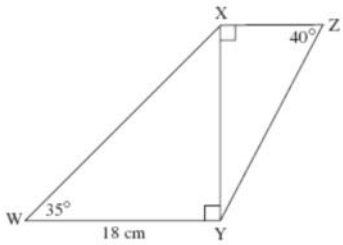


$\tan 35^\circ = \frac{10}{x}$

$x\tan 35^\circ = 10$

$x = \frac{10}{\tan 35^\circ} = 14.3$

Solving Right Triangles (Find all the missing sides and angles)



XY: $18\tan 35^\circ = \frac{XY}{18} \times 18$

$XY = 12.6$ cm

WX: $18^2 + 12.6^2 = WX^2$

$WX = 22$ cm

XZ: $\tan 40^\circ = \frac{12.6}{XZ}$

$XZ = 15$ cm

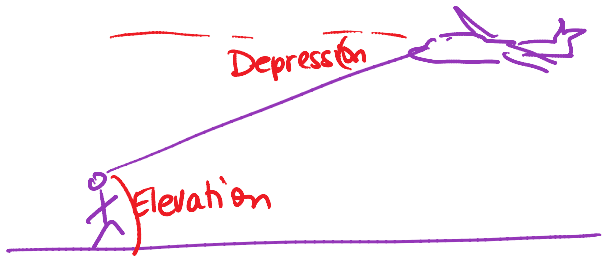
YZ: $15^2 + 12.6^2 = YZ^2$

$YZ = 19.6$ cm

Angle of Elevation

=

Angle of Depression



Chapter 4 (Exponents and Radicals)

Perfect Square → have 2 equal factors
eg. 1, 4, 9, 16, ... (pairs in factor tree)

Perfect Cube → 3 equal factors
eg. 1, 8, 27, 64, ...

Prime Factorization eg. $63 = 3 \times 3 \times 7$

$3 \wedge 21$

$3 \wedge 7$

MATH $4:\sqrt[3]{}$

Square Root

eg. $\sqrt{4} = 2$

Cube Root

eg. $\sqrt[3]{8} = 2$

Exponent Laws * repeated multiplication → write it out!

eg. 1: $\frac{(2x)^3}{x^0} = \frac{8x^3}{1} = 8x^3$

eg. 2 $\left(\frac{1}{4}\right)^{-3} \div \left(\frac{1}{4}\right)^{-4}$

$= \left(\frac{1}{4}\right)^{-3+(+4)} = \left(\frac{1}{4}\right)^{1} = \frac{1}{4}$

Negative Exponents → repeated division

eg. $x^{-3} = \frac{1}{x^3}$

eg. $\frac{a^{-2}b^3}{c^{-5}} = \frac{c^5 b^3}{a^2}$

Rational Exponents → all same rules apply!

eg. 1: $a^{\frac{1}{2}} a^{\frac{3}{5}} = a^{\left(\frac{1}{2}+\frac{3}{5}\right)} = a^{11/10}$

$\frac{5}{10} + \frac{6}{10}$

eg. 2: Evaluate $16^{\frac{1}{4}} = \sqrt[4]{16} = 2$

$4 \wedge 4$

$2\ 2\ 2\ 2$

Rational vs Irrational Numbers

→ fraction
• any terminating or repeating decimal

• non-terminating or repeating.
eg. π, $\sqrt{2}$, $\sqrt[3]{5}$, ...

Radicals (Entire vs Mixed)

$\sqrt{75} = 5\sqrt{3}$

$25 \wedge 3$

$5\ 5$

eg. $-2\sqrt[3]{3} = -\sqrt[3]{2 \cdot 2 \cdot 2 \cdot 3} = -\sqrt[3]{24}$

PRACTICE PROVINCIAL: #6 - 10 (Non-Calc)
32, 34-37 (Calc)

Chapter 5 (Polynomials)

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Simplifying Polynomials

eg. $(3x^2-4x+2)-(-x^2+x-7)$ "TRINOMIAL" Degree = 2

$= 3x^2-4x+2+x^2-x+7 = 4x^2-5x+9$

Multiplying Polynomials (FOIL)

eg.1 $(x+2)(2x-3)$

$= 2x^2-3x+4x-6$

$= 2x^2+x-6$

eg.2 $(3a-4)^2$

$= (3a-4)(3a-4)$

$= 9a^2-12a-12a+16$

$= 9a^2-24a+16$

GCF (Always check first!)

eg. $\frac{8a^2b^3}{4a^2b} - \frac{24a^3b^2}{4a^2b} + \frac{12a^2b}{4a^2b}$ GCF $= 4a^2b$

$= 4a^2b(2b^2-6ab+3)$

Factoring Trinomials

eg. $1x^2+6x+9$ no GCF

$-+-=6$, $-\times-=9$ Add to b, Multiply to c

	x	3
x	x^2	$3x$
3	$3x$	9

$\rightarrow 1,9$ (3,3)

$= (x+3)(x+3)$

$= (x+3)^2$

eg. $3x^2-11x-4$ no GCF

-12, $-12+1=-11$, $-12\times1=-12$

$= 3x^2-12x+x-4$

$= 3x(x-4)+1(x-4)$

$3x^2$		
		-4

$= (x-4)(3x+1)$

Factoring Difference of Squares

eg. $4x^2-9$

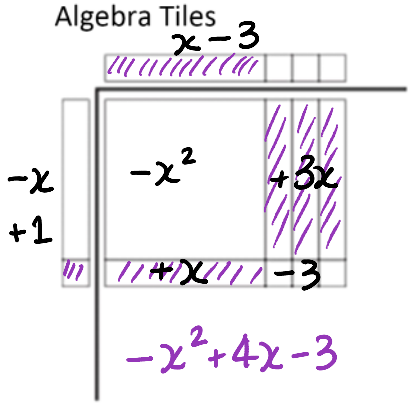
$6+-6=0$, $6\times-6=-36$ no x term

	2x	3
2x	$4x^2$	$6x$
-3	$-6x$	-9

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

Algebra Tiles

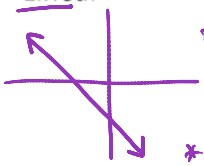
shaded = +, unshaded = −



$-x^2+4x-3$

Chapter 6 and 7 (Linear Relations and Equations)

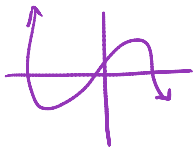
Linear vs Non-Linear Relations



Degree = 1

$y = 2x^1 - 5$

*constant slope



$y = x^3 - x + 2$

Degree ≠ 1

Independent vs Dependent Variables

- "Input"
- usually x, time, ...

- "Output"
- usually y

Function Notation

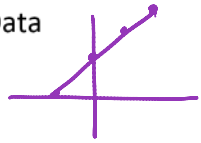
$f(x) = 3x - 1$

output, input

$f(2) = 3(2) - 1 = 5$

plug in!

Discrete vs Continuous Data



Domain vs Range

all x values → use list if discrete

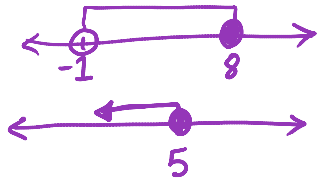
all y values

Interval Notation vs Set Notation vs Number Line

★ (6.3)

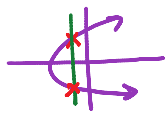
$x \in (-1, 8]$ $\quad \{x \mid -1 < x \leq 8, x \in \mathbb{R}\}$

$y \in (-\infty, 5]$ $\quad \{y \mid y \leq 5, y \in \mathbb{R}\}$



Vertical Line Test for Functions

only 1 y for each x.



Not a Function!

Slope

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope Intercept Form

$y = mx + b$

slope, y-intercept

Intercepts

x-int → plug in $y = 0$

y-int → plug in $x = 0$

Point Slope Form

$y - y_1 = m(x - x_1)$

slope

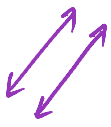
(x_1, y_1) = any point

General Form

$Ax + By + C = 0$

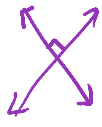
$A > 0$, no fractions

Parallel Lines



• have same slope

Perpendicular Lines

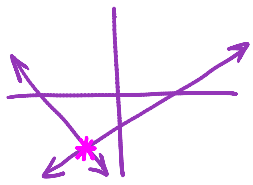


• have negative reciprocal slopes

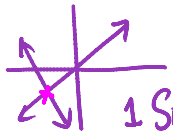
eg. $-\frac{2}{5}$ and $\frac{5}{2}$

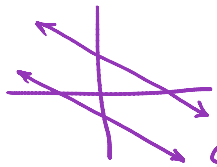
Chapter 8 and 9 (Systems of Equations)

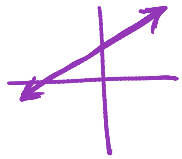
System of Equations → 2 Equations together
→ Solution is the intersection



Number of solutions to a system





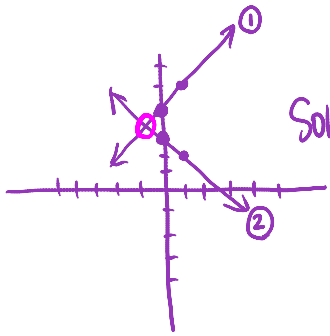


Verify of solution to a system
→ Plug in to both equations.

Solving a system by:

1. Graphing

eg. $\begin{cases} y = x + 4 \ ① \\ y = -x + 3 \ ② \end{cases}$



Solution: (-0.5, 3.5)

2. Substitution

eg. $\begin{cases} y = 3x - 1 \\ x + y = 11 \end{cases}$

$x + 3x - 1 = 11$
$4x - 1 = 11$
$+1 \quad +1$
$\frac{4x}{4} = \frac{12}{4}$
$x = 3$

$y = 3(3) - 1$
$y = 8$

$(3, 8)$

3. Elimination

eg. $\begin{cases} 3x + 2y = 10 \\ 2x - y = 4 \quad \times 2 \end{cases} \rightarrow \begin{cases} 3x + 2y = 10 \\ + \ 4x - 2y = 8 \end{cases}$

$\frac{7x}{7} = \frac{18}{7}$

$x = \frac{18}{7}$

To get y, plug in

Ch. 8&9: #4, 5, 30, 31, 56, 57