Geometry

Triangles	Are three sides, three angles, and all angles add up to 180 degrees.
Acute Triangles	All interior angles must be 0-90 degrees. All equilateral triangles are acute.
Scalene Triangles	All sides and angles differ in measure.
Right Triangles	Only one angle is equal to 90 degrees
Isosceles Triangles	Two opposite sides and angles are equal to each other.
Equilateral Traingles	All sides equal. All angles equal to 60 degrees.

Finding a missing internal angle:
$a + b + c = 180°$
$50° + 30° + c = 180°$
$180° - 50° - 30° = c$
$100° = c$

Straight lines are equal to 180 degrees.

Finding the exterior/internal angle with a straight line:
$x + y = 180°$
$40° + y = 180°$
$180° - 40° = y$
$140° = y$

Polygons

Polygons	Any enclosed geometrical shape that is composed of straight lines.
Regular Polygons	All sides and interior angles are equal.
Diagonals	A segment connecting two non-adjacent corners in a polygons.

Polygons (cont)

Formula to find the sum of interior angles:	$180°(n - 2)$. n = number of sides.
Formula to find the measure of interior angles:	$(180°(n - 2))/n$

Find the sum of interior angles of a nine (9) sided polygon.
$180°(n - 2)$
$180°(9 - 2)$
$180°(7)$
$1260°$

Find the measure of interior angles of a 3 sided polygon:
$(180°(n - 2))/n$
$(180°(3 - 2))/3$
$(180°(1))/3$
$180°/3$
$60°$

Quadrilaterals

Quadrilaterals	Any four sided polygon.
Parallelograms	Opposite sides are parallel to each other. Opposite sides and angles are equal in measure.
Rhombus	Parallelograms with all sides that are equal.
Rectagles	Parallelograms with opposite sides equal in measure. All angles equal to 90°.
Squares	Parallelograms with all sides that are equal. All sides are 90°
Isosceles Trapezoids	One set of sides are parallel. Other sides equal in measure.
Kite	Two sets of equal sides. No lines are parallel.

Squares are also Rhombus, Rectangles, and Isosceles Trapezoids

Diagonals

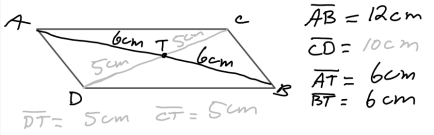
Formula for finding the number of diagonals in a polygon:	D = (n(n-3))/2

Diagonals
- Cut parallelograms into two equal triangles.
- Bisect each other.

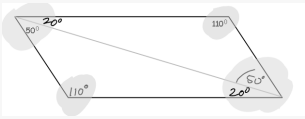
Adjacent angles in a parallelogram add up to 180°

Opposite angles are equal to each other.

Diagonal Diagram



Adjacent/Opposite Angles Diagram



Same colours are opposite angles. Adjacent angles are next to each other.

Probability

Probability	The mathematically likelihood that an event will occur. A ratio that compares the possible successful outcomes, to the total number of outcomes.
Probability Formula	Number of successful outcomes, divided by total number of outcomes. (1/10)

Probability (cont)

Odds	A ratio that compares the number of possible successful outcomes to the number of possible unsuccessful outcomes.
Odds Formula	Successful Outcomes : Unsuccessful Outcomes
Theoretical Probability	A ratio that compares the number of possible successful outcomes to the total number of possible outcomes Determined by reason or calculation.
Experimental Probability	A ratio that compares the number of times an event occurs to the total number of trials or tests Determined by experiment.
Expected Value	Expected value is an application of probability that involves the likelihood of a gain or loss.

Probability (cont)

Expected Value Formula	EV=[%(gain) x $gain]-[%(lose) x $loss]

Probability of picking card #5: 1/5
Odds of picking card #5: 1:4
Odds of not picking card #5: 4:1
Theoretical Probability: 1/5 chance of choosing card #5.
Experimental Probability: He picked up card #5 two times. 2/5 of picking card #5.

There is a 1 in 5 chance of winning $4.00. It costs $1.00 to play.

EV=[%(gain) *$(gain)] - [%(loss)* $(loss)]
EV=[1/5 *4] - [4/5* 1]
EV=[0.2 *4] - [0.8* 1]
EV=0.8 - 0.8
EV=$0

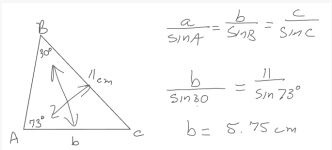
Law of Sines

Sine Law	Used to find lengths of sides, or angles of non-right triangles.
Formula:	*a*/sin(A) = *b*/sin(B) = *c*/sin(C)

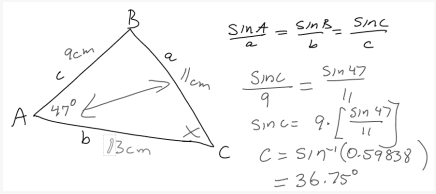
Find side *a*:
a/sin(30°) = 15cm/sin(45°)
a = sin(30°)(15cm/sin(45°))
a = 10.61cm

Find sin(C):
sin(C)/9 = sin(47)/11
sin(C) = 9*[sin(47)/11]
C = $\sin^{-1}$(0.59838)
C = 36.75°

Find Side Diagram: Law of Sines



Find sin(C) Diagram



Law of Cosines

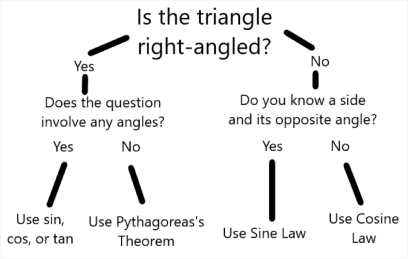
Cosine Law	Used to find angles or sides when Sine Law isn't possible.
Formula to find with a given angle:	$a^2 = b^2 + c^2 - 2bc\text{CosA}$
Formula when there are no angles:	$\text{Cos(A)} = (b^2 + c^2 - a^2)/2bc$

a/sin(40°) = 15/sin(B) = 8/sin(C) cannot be calculated so Cosine Law is used

Find side (*a*)
$a^2 = b2 + c2 - 2bc\text{CosA}$
$a^2 = 15^2 + 8^2 - 2(15)(8)\text{Cos}(40°)$
$a^2 = 225 + 64 - 240\ \text{Cos}(40°)$
$a^2 = 105.14933$
$a = \sqrt{105.14933}$
$a = 10.25$

Find cosine(A)
$\text{Cos(A)} = (b^2 + c^2 - a^2)/2bc$
$\text{Cos(A)} = (7^2 + 5^2 - 6^2)/2(7)(5)$
Cos(A) = (49 + 25 - 36)/70
Cos(A) = 0.542857
A = $\cos^{-1}$ (0.542857)
A = 57.12°

Diagram: What to use



Measurement

Accuracy	Accuracy of a measurement is how close the measurement is to the true value.
Precision	Precision of measurements is how close they are to each other. The precision is determined by the number of decimal places.
Uncertainty	Uncertainty is the natural variation in measurements associated with instruments
Tolerance (∓)	The total amount that a measurement is allowed to vary. Add or subtract Tolerance to Nominal Value.
Nominal Value	The middle number that can be added or subtracted from to show the minimum or maximum value.

Tolerance: (Maximum Value - Minimum Value)/2
[Eg. (130-120)/2 = ∓5].
125 ∓ 5 = (125 - 5 = 120) or (125 + 5 = 130)
Tolerance can have different maximum and minimum values.
Eg. 125 (+5) (-3) = [125 + 5 = 130] or [125 - 3 = 122]

Measurement (continued)

Nominal Value: Minimum Value + Tolerance
Eg. 120 + 5 = 125.

Precision: Lowest unit of measurement of the measuring device or the significant decimal place.
87.32kg = 0.0>*1*<.

Uncertainty: Because not all measuring devices are accurate, you include an error with the measurement.
(Smallest Measure/2) Eg. 0.1/2 = ∓0.05

Central Tendency

Statistics	Is based upon data collected. From that, inferences and speculations are made. It is reliant upon the data and the interpretation of the data.
Mean	The average of all data. The sum of all data, divided by the number of data.
Median	The set of values that is the middle of values arranged in ascending or descending order.
Even Median Formula	X[**n**/2] + X[(**n**/2)+1])/2. (**n** = number of values) (X = position of values)
Mode	The value that appears the most frequently.
Outlier	A piece of data that is significantly different from the rest.

5, 7, 8, 8, 8, 9, 10, 12, 13, 14, 15

Mean: (5+7+8+8+8+9+10+12+13+14+15)/11 = 9.9 = 10
Median (Odd): Middle value = 9

5, 7, 8, 8, 8, 9, 10, 12, 13, 14, 15, 35

Median (Even): (X[12/2] + (X[(12/2)+1]/2
= (X[6] + X[6+1])/2
= (10 + 12)/2
= 22/2
= 11
Mode: 8

Other Statistical Measurements

Range	The difference from the highest value to the lowest value in the data set.

Other Statistical Measurements (cont)

Trimmed Mean	Removing the highest and lowest values and calculating the mean so that data is accurately presented.
Weighted Mean	The average or mean of a data set in which each data point does not contribute an equal amount to the final average.
Weighted Mean Formula	Sum of the product of each item and its weight, divided by sum of the weightings

5, 7, 8, 8, 8, 9, 10, 12, 13, 14, 15, 35

Trimmed Mean: Remove 5 and 35. (7+8+8+8+9+10+12+13+14+1-5)/10 = 10.4, rounded up = 10

Weighted Mean: Will be in a diagram because I cannot figure out how to use cells.

Weighted Mean Diagram

Grade	Percent of survey population	Percent who said they are songwriters
Grade 9	23%	19%
Grade 10	31%	22%
Grade 11	20%	34%
Grade 12	18%	67%
Teachers	8%	48%

$$\text{Weighted Mean} = \frac{\text{Sum of the product of each item and its weight}}{\text{Sum of the weightings}}$$
$$= \frac{(23 * 19) + (31 * 22) + (20 * 34) + (18 * 67) + (8 * 48)}{23 + 31 + 20 + 18 + 8}$$
$$= \frac{3389}{100}$$
$$= 33.89$$

Percentiles

Percentiles	A value below which a certain percent of the data falls.
Percentile Rank	A percentile rank of 50 (usually written P50) is the median because 50% (or half) of the values in the set are below the median value.
Percentile Rank Formula	$P=(B/\mathbf{n}) * 100$. B: The number of scores below a given score, **n**: The number of scores. Always rounded to the nearest whole number
Stem Leaf Plot	A way to organize data in order of place value. The "tens digit and greater" is the stem and the "ones digit" is the leaf.
^	Will show on a diagram because I cannot figure out cells.

Ron scores 82% on his biology exam. A total of 200 students who wrote the same exam. 135 scored lower than Ron. What is Ron's percentile rank?

$P=(B/\mathbf{n}) * 100$
$P=(135/200) * 100$
$P=(0.675) * 100$
$P=67.5$
$P=68$th Percentile Rank

Stem Leaf Plot Diagram

Eg. 32, 44, 57, 78, 44, 40, 47, 39, 35

Stem (tens)	Leaf (Ones)
2	7 9
3	2 5 9
4	0 4 4 7
5	7
7	8

The "tens digit and greater" is the stem and the "ones digit" is the leaf.