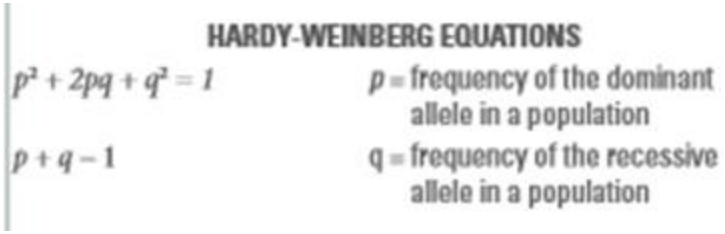
Math Station 1



A population of beavers revealed that 12 of them show a rare recessive condition. The other 88 beavers in this population show no condition.

If this population is in Hardy Weinberg equilibrium, what is the frequency of the dominant allele?

Give your answer to the nearest hundredth

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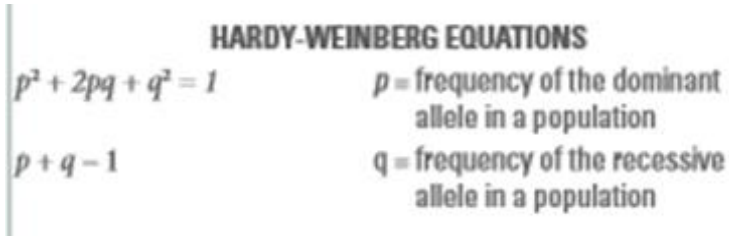
Math Station 2



A population of cacti revealed that 21% have a dominant condition.

If this population is in Hardy Weinberg equilibrium, what is the frequency of the heterozygous?

Give your answer to the nearest tenths place

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Math Station 3

Chi-Square

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

CHI-SQUARE TABLE

Degrees of Freedom

p	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.82	9.49	11.07	12.59	14.07	15.51
0.01	6.64	9.32	11.34	13.28	15.09	16.81	18.48	20.09

40 fruit flies were put in a choice chamber. The results of their location are shown below:

Time	Number of fruit flies on orange	Number of fruit flies on apple
0 min	20	20
10 min	8	32

Determine **the chi square value after 10 min.**

Round to the nearest whole number.

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Math Station 4

Chi-Square

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

CHI-SQUARE TABLE

Degrees of Freedom

p	1	2	3	4	5	6	7	8
0.05	3.84	5.99	7.82	9.49	11.07	12.59	14.07	15.51
0.01	6.64	9.32	11.34	13.28	15.09	16.81	18.48	20.09

In pea plants, purple (P) is dominant to white (p). One hundred purple pea plants were crossed in the P generation. The results of the F1 are shown below:

Phenotype	Number observed in F1
Purple	63
White	37

Determine **the chi square value.**

Round to the nearest tenths place.

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Math Station 5

STATISTICAL
Standard Error
$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$
Standard Deviation
$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$

A sample of lizards in the Caribbean show variation in their back-leg length.

Given the following data, determine the standard error for this data.

Length(cm): 2.0, 2.2, 3.2, and 2.5

Calculate the standard error.

Round the answer to the nearest hundredth.

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AP Biology Math Stations

Math Station 6

RATE AND GROWTH	
Rate	dY = amount of change
dY/dt	t = time
Population Growth	B = birth rate
dN/dt=B-D	D = death rate
Exponential Growth	N = population size
$\frac{dN}{dt} = r_{max}N$	K = carrying capacity
Logistic Growth	r_{max} = maximum per capita growth rate of population
$\frac{dN}{dt} = r_{max}N\left(\frac{K-N}{K}\right)$	

A population of Spotted Fritillary butterflies has 200 individuals and this population exhibits logistic growth. If the carrying capacity is 500 butterflies and r = 0.1 individuals/(individuals x month), what is the maximum population growth rate for the population?

Round your answer to the <u>nearest tenths.</u>

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Math Station 7

The molar concentration of a sugar solution in an open beaker has been determined to be 0.3M. Calculate the solute potential at 27 degrees Celsius.

Round your answer to the <u>nearest tenths.</u>

Water Potential (Ψ)

$\Psi = \Psi p + \Psi s$

Ψp = pressure potential

Ψs = solute potential

The water potential will be equal to the solute potential of a solution in an open container, since the pressure potential of the solution in an open container is zero.

The Solute Potential of the Solution

$\Psi s = -iCRT$

i = ionization constant (For sucrose this is 1.0 because sucrose does not ionize in water.)

C = molar concentration

R = pressure constant (R = 0.0831 liter bars/mole K)

T = temperature in Kelvin (273 + °C)

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Math Station 8

Temperature Coefficient Q_{10}

$$Q_{10} = \left(\frac{k_2}{k_1}\right)^{\frac{10}{t_2 - t_1}}$$

Primary Productivity Calculation

mg O_2/L x 0.698 = mL O_2/L

mL O_2/L x 0.536 = mg carbon fixed/L

t_2 = higher temperature
t_1 = lower temperature
k_2 = metabolic rate at t_2
k_1 = metabolic rate at t_1
Q_{10} = the *factor* by which the reaction rate increases when the temperature is raised by ten degrees

Data taken to determine the effect of temperature on the rate of respiration in a lizard is given in the table below.

Temperature (C)	Heart Rate
15	60
25	100

Calculate Q_{10} for this data.

Round to the nearest whole number.

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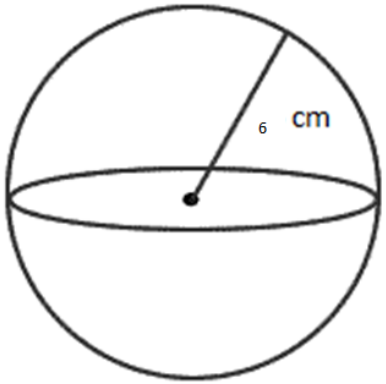
SURFACE AREA AND VOLUME	
Volume of a Sphere	r = radius
$V = 4/3\ \pi r^3$	l = length
Volume of a Cube (or Square Column)	h = height
$V = l\ w\ h$	w = width
Volume of a Column	A = surface area
$V = \pi r^2 h$	V = volume
Surface Area of a Sphere	Σ = Sum of all
$A = 4\ \pi r^2$	a = surface area of one side of the cube
Surface Area of a Cube	
$A = 6\ a$	
Surface Area of a Rectangular Solid	
$A = \Sigma$ (surface area of each side)	

Math Station 9



What is the Surface Area/Volume ratio for this cell?

Round your answer to the <u>nearest hundredths.</u>

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Dilution – used to create a dilute solution from a concentrated stock solution

$C_iV_i = C_fV_f$

i = initial (starting)

C = concentration of solute

f = final (desired)

V = volume of solution

Math Station 10

A student has a 2 g/L solution. He dilutes it and creates 3 L of a 1 g/L solution.

How much volume of the original solution did he dilute?

Round to the <u>nearest tenths.</u>

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AP Biology Math Stations

°C = (°F – 32) *5/9

°F = °C * 9/5 + 32

K = °C + 273

Gibbs Free Energy
$\Delta G = \Delta H - T\Delta S$
ΔG = change in Gibbs free energy
ΔS = change in entropy
ΔH = change in enthalpy
T = absolute temperature (in Kelvin)
pH = – log [H+]

Math Station 11

Calculate the Gibbs free energy change (ΔG) for the following chemical reaction: ATP→ADP + Pi

The reaction occurs at 68 °F, the change in heat (ΔH) = 19,070 cal, and the change in entropy (ΔS) = 90 cal/K.

Determine the **kcal value.**

Round to the <u>nearest tenths place</u>.

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AP Biology Math Stations

SURFACE AREA AND VOLUME	
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Surface Area of a Cube	
$A = 6\ a$	
Surface Area of a Rectangular Solid	
$A = \Sigma$ (surface area of each side)	

Math Station 12

A student has cut two blocks of phenolphthalein agar to measure the rate of diffusion in a vinegar solution.

Cube A: 4cm on each side

Cube B: 2 cm on each side

What the difference in surface area between the two blocks? Round answer to the nearest tenths place.

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AP Biology Math Stations

During AP Review Week, I am doing stations. One station is a concept map for the Big Idea, I assign group. Another is taking practice exam together. Another is reviewing Bozeman videos. The last are these math stations

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