Session 1.1: Where are you in math?

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By the end of the summer you'll master the material well enough to answer these questions confidently. Just take a breath, relax, and do you thing – I don't expect everyone to get everything right. I'm excited to meet you tomorrow!

Please write your answers on a separate sheet of paper and turn that in. Partial answers are useful for me – you don't need to be 100% right. Please include work, even if it is ugly scratch work. No calculators are allowed. Skip around because problems vary in difficulty.

1 Ordering of real numbers

Please order the following numbers: $\frac{5}{6}, \frac{5}{13}, 0.6, \frac{1}{6}, 0.72, \frac{3}{20}, \frac{1.65}{3}, \frac{7/4}{2}$

For each ordered pair, defend your claim with a picture, reformulation, or something equivalently convincing. For clarity, for the above 8 numbers, you only need 7 explanations.

Example explanation 1: $0.7 < \frac{5}{7}$ because $0.7 = \frac{7}{10} = \frac{49}{70} < \frac{50}{70} = \frac{5}{7}$

Example explanation 2: $\frac{1}{3} < 0.75$ because *(insert picture of pie with shading)*

2 Calculating tip and interest

(a) Suppose you receive a restaurant bill for \$75. Calculate the waiter's tip . . .

    i. If you tip 15% (*hint:* 15% of \$75)

    ii. If you tip 20%

3 Rates and proportions

(a) If Jose folds 3 shirts in 5 minutes, how many complete shirts can Jose bake in 13 minutes?

(b) If Jose eats 2 burritos per hour and Nishith eats 3 burritos per hour, then, as a team, how many burritos can Jose and Nishith eat per hour?

4 Statistical thinking

(a) Suppose we tag 100 buffalo and then release them back into the wild. If we fly a helicopter over their grasslands and 20 out of 100 buffalo we see are tagged, what would you estimate as the size of the buffalo population?

5   Cookie-cutter geometry

(a) Calculate the area of a circle with diameter 2 cm. Recall that $Area = \pi * r^2$.

(b) What is the are of a circle or radius 2 cm? Radius 4 cm? Radius 6 cm? In a sentence, explain how the area changes as we increase the radius?

6   Geometry with a dash of rates and proportions

(b) Suppose Jose is 6 tall and casts a 9 shadow. How long is the shadow of a 10 lamp post? What if he casts an 11 shadow?

7   Geometry and statistical thinking

(a) Consider a dartboard with two concentric circles of radius 5 cm and 10 cm. If I throw a dart at the dartboard, what is the probability that I will hit the inner circle?