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Module 1.1: Scaffold Support worksheet: INTRICACIES OF A VOLLEYBALL COURT

Try calculating the following to determine the width of a scaled down court.

1. $\frac{0.25 \text{ inch } (\frac{1}{4})}{1 \text{ foot}} = \frac{7.4 \text{ inches}}{29.6 \text{ feet}}$

2. $\frac{0.5 \text{ inch } (\frac{1}{2})}{1 \text{ foot}} = \frac{14.8 \text{ inches}}{29.6 \text{ feet}}$

3. $\frac{0.125 \text{ inch } (\frac{1}{8})}{1 \text{ foot}} = \frac{3.7 \text{ inches}}{29.6 \text{ feet}}$

Which of the three scales would have a reasonable end width? Why?
Answers will vary.

Try calculating the following to determine the length of a scaled down court.

3. $\frac{0.25 \text{ inch } (\frac{1}{4})}{1 \text{ yard}} = \frac{14.75 \text{ inches}}{59 \text{ feet}}$

4. $\frac{0.5 \text{ inch } (\frac{1}{2})}{1 \text{ yard}} = \frac{29.5 \text{ inches}}{59 \text{ feet}}$

5. $\frac{0.125 \text{ inch } (\frac{1}{8})}{1 \text{ yard}} = \frac{7.3 \text{ inches}}{59 \text{ feet}}$

Which of the three scales would have a reasonable end length?
Answers will vary.

Coaches have clip boards that are 8.5 x 11 inches. What scale would you use to ensure the field fix on a single sheet of paper?
The only listed scale that would fit on the paper is ⅛ inch; however, ⅙ of an inch would be ideal. The length would be 9.8 inches and the width would be 4.8 inches.

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Module 2.1: COMMUNICATION AND DRILLS

Video Title: ______________________

Written instructions for your partner: Answers will vary.

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1. After watching the video, how well did you perform the drill on a scale of 1 to 5?
   Poor Just like the video
   1 2 3 4 5
   Justify:____
   ____

2. After watching the video, how would you rate your partner's written instructions on a scale of 1 to 5?
   Poor Just like the video
   1 2 3 4 5
   Justify:____
   ____

3. What descriptive words could your partner have used that would have made the drill easier to understand? Add on their written instructions in blue.

4. What edits would you make to your partner’s written instruction. Add any changes in green.

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Module 3.1: VOLLEYBALL PROPERTIES

Volleyball	Observations on the Properties: Material, Texture, Bounce-ability Answers will vary.
Light Touch Volleyball	Example: Smooth, easy to bounce
Recreation Volleyball	Example: Thick material, heavy, more difficult to bounce
First Touch Volleyball	Example: Thin material, light, easy to bounce,
Balloon	Example: Thin material, lightest, falls slowly, bounces easily

Volleyball	Performance (Bump Test) Distance (Ft)	Mass (grams)	Volume $V = 4/3\pi r3$ (in^3)	Density (mass/volume) g/in^3
Light Touch Volleyball	Example: 4 feet	225.6 g	9202.7 in^3	0.02 g/in^3
Recreation Volleyball	Example: 3.5 feet	280g	9202.7 in^3	0.03 g/in^3
First Touch	Example:	175g	9202.7 in^3	0.19 g/in^3

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Volleyball	5 feet			
Balloon	Example: 1.5 feet	50 g	9202.7 in^3	0.005 g/in^3

How does density affect performance? (Support your answer with evidence). Answers will vary.

Example: Based on the correlation in the data, as density decreases, the bounce height increases in the balloon.

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Module 4.1: CALCULATING TOTAL FORCE

What variables do you need to control? Answers will vary.

Example: The person serving, the type of the serve, your footing, and the type of ball used.

	Speed (measured by radar)	Time of travel (From video)	Acceleration (Calculated (S_I-S_F)/time)	Mass	Force F = MA
Initial Serve	4.7 m/s	2.3 s	2.0 m/s^2	0.225 kg	0.5 N
Easy Serve	3 m/s	4.8 s	0.6 m/s^2	0.225 kg	0.1 N
Hard Serve	6.2 m/s	1.7 s	3.6 m/s^2	0.225 kg	0.8 N

How does a change in force affect a change in motion? Support your answer with evidence from the experiment.

Answers will vary based on student data.

Example: When I worked to increase the speed of the volleyball on my serve, the force increased as well. In our experiment, this is evident by the higher calculated force; the serve I tried to hit hard had a force of 0.8 Newton’s, and the easy serve had a force of 0.1 Newtons. This makes sense because in order to make the serve harder, I needed to put more force on the ball.

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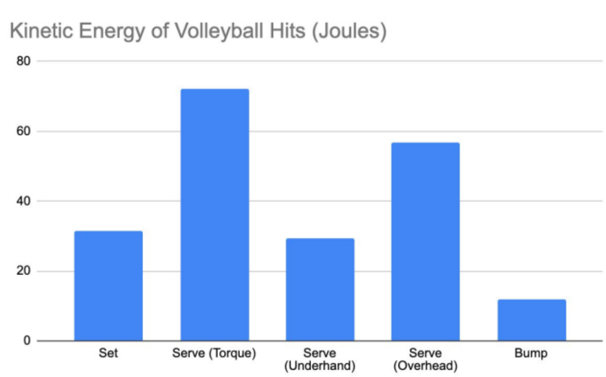
Module 6.1: KINETIC ENERGY AND SPEED

Hit Type	Trial 1	Trial 2	Trial 3	Average Velocity	Mass	Kinetic Energy (Calculated) $K=\frac{1}{2} MV^2$
Set	12 mph	15 mph	9 mph	5.3 m/s	0.225kg	31.6 J
Serve (Torque)	21 mph	18 mph	15 mph	8 m/s	0.225kg	72 J
Serve (Underhand)	13 mph	8 mph	14 mph	5.1 m/s	0.225kg	29.3 J
Serve (Overhead)	8 mph	17 mph	23 mph	7.1 m/s	0.225kg	56.7 J
Bump	9 mph	6 mph	15 mph	4.5 m/s	0.225kg	11.8 J



Graph the Kinetic Energy of each hit.
Why do some hits in volleyball have more kinetic energy than others? (Support your claim with evidence and reasoning).

Why do some hits in volleyball have more kinetic energy than others? (Support your claim with evidence and reasoning).

Answers will vary based on data and knowledge of the sport.

Example: Some volleyball hits, such as Torque and Overhand serves, have more kinetic energy. The data shows that a torque serves has a kinetic energy of 72 J, where bumps have 11.8 J of kinetic energy. The overhead and torque serves have more kinetic energy due to the nature of the serve;

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they are meant to be aggressive/have more energy in the hit to make it more difficult for the other team to return the serve. Whereas, the set and bumps are passed within the team. Lower kinetic energy would benefit teammates trying to complete the next pass.

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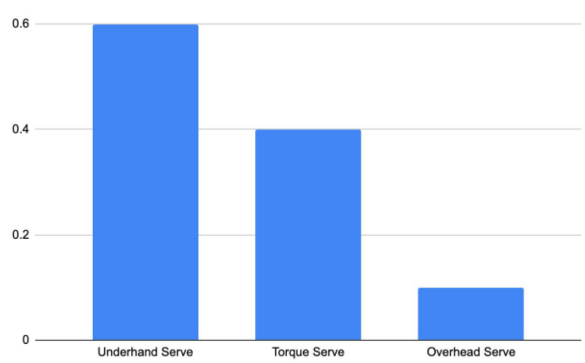
Module 7.1: SUCCESSFUL SERVING

Place an X when the serve is completed (hits the wall). Example data below.

Serve	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	Probability
Underhand Serve	x	x			x			x	x	x	0.6
Torque Serve			x				x		x	x	0.4
Overhead Serve				x							0.1



Graph the probability of each serve below
Answers will vary based on data collection.
Example: Based on serve success rate, the underhand serve is the best option.

Which serve is more likely to be successful in a match? Support your answer with data.
Answers will vary.
Example: An underhand serve will be more successful at a match because of the higher probability.

In an average volleyball game, there are between 125 - 250+ serves. Calculate the success rate of each serve and select which serve you would use in a match. Answers will vary.

Example: Based on 175 serves and example probability from above:
Underhand Serve: 105 serves
Torque Serve: 70 serves
Overhand Serve: 18 serves

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Module 8.1: ADAPTIVE TECHNOLOGY

Create a device that will help adaptive players retrieve the ball after a play.

Brainstorm ways to help Adaptive Players Answers will vary.

Select a Design ((grade-based) including the following: *draw in detail, label materials and provide measurements*):

Prototype Testing Plan: Answers will vary.