SCIENCE

Year 4
Answers

Lesson 17

Topic: Testing games

Hosting a *60-second slam* (1)

Lesson concepts

- Forces can be exerted by one object on another through direct contact or from a distance
- Appropriate materials, tools and equipment can be used safely
- Data is represented and used to identify patterns
- Investigations can be reflected on
- Ideas and findings can be communicated

Learning alerts

Be aware of students thinking that in order for a game to be successful, all contestants must be able to complete it.

Suggested next steps for learning:

Inform students that due to the variety of ages or abilities of contestants, not all will be successful at completing the game. As long as the majority of people experience success, the game could be considered successful/suitable overall.

Lesson notes

In this lesson, students will evaluate a game by playing it and making judgments about it. This is a short lesson and students may use extra time to complete any tasks or review understanding from earlier lessons.

The students will play a game that involves flinging a ball from a spoon. Ensure that no breakable objects are in the area in which students play the game.

Lesson answers

1. No answer required.
2. a. For example: Yes. (**Note:** Students may not be able to play the game because they find it too difficult.)
   b. For example: I liked hitting the spoon with different amounts of force to try and get the ball in the cup. I liked it because it was challenging.
   c. For example: The game was very hard and I couldn't get the ball into the cup.
   d. For example:

Topic	1 (low)	2	3	4	5 (high)
difficulty					✓
interest				✓	
fun				✓	
use of forces					✓

e. For example: $\frac{8}{10}$

f. For example: The forces were the downward push on the spoon by the hand, the upward push from the spoon to the ball, air friction as the ball moves through the air, the downward pulling force of Earth as the ball falls into the cup, and the upward push from the ground when the ball lands.

g. For example: Moving the cup further away from the spoon and rubber would make the game harder.

h. For example: Using a much larger cup, spoon and a ball would make the game easier.

Lessons 18–19

Topic: Testing games

Hosting a *60-second slam* (2)

Lesson concepts

- OA Forces can be exerted by one object on another through direct contact or from a distance
- O Appropriate materials, tools and equipment can be used safely
- OA Data is represented and used to identify patterns
- O Investigations can be reflected on
- OA Ideas and findings can be communicated

Learning alerts

Be aware of students thinking that in order for a game to be successful, all contestants must be able to complete it.

Suggested next steps for learning:

Inform students that due to the variety of ages or abilities of contestants, not all will be successful at completing the game. As long as the majority of people experience success, the game could be considered successful/suitable overall.

Lesson notes

In this lesson, students will collect data about forces games by observing and playing games for the *60-second slam* game show. This final task is best completed in one double lesson.

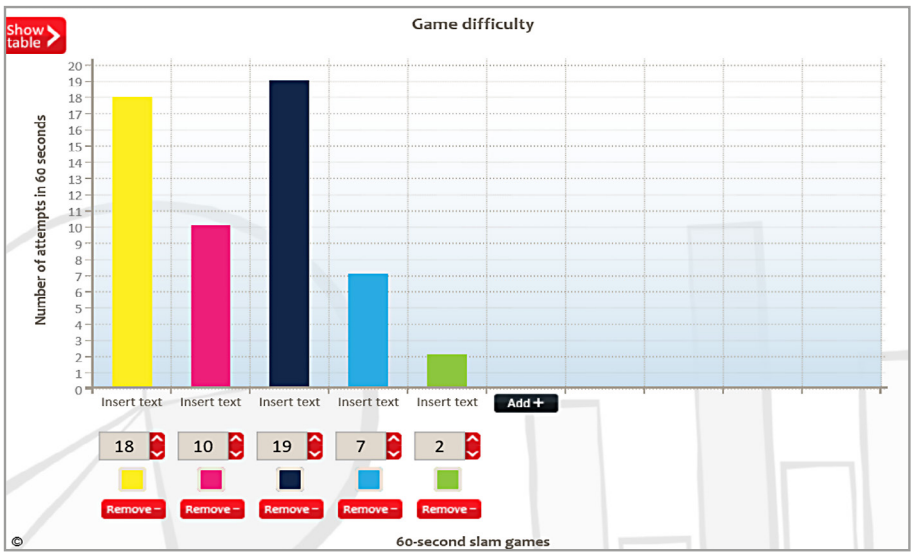
Practical information

Safety

- Consider the environment surrounding the activity and the availability of free space.
- Materials used for games should be clean and free from sharp edges.

Lesson answers

1. No answer required.
2. a. The main force in this game was a pushing force from the hand to make the car roll.
   b. For example: Yes; no.
   c. For example: It took eighteen attempts before the car was successfully pushed into the cup.
3. No answer required.
4. a. The main force in this game was a pushing force from the hand to make the planes move through the air.
   b. For example: Yes; no.
   c. For example: It took ten attempts before the two planes landed together.
5. No answer required.
6. a. The main force in this game was a pushing force from the hand to make the ball move.
   b. For example: Yes; no.
   c. For example: It took nineteen attempts before the ball bounced into the bin.
7. No answer required.
8. a. The main force in this game was a pushing force from the fingers to make the sticky tape roll.
   b. For example: Yes; no.
   c. For example: It took seven attempts before the sticky tape made a pushing force to make the marble roll.
9. No answer required.
10. a. The main force in this game was a pushing force from the hand to make the ball move across the floor and then push over the bottle.
    b. For example: Yes; no.
    c. For example: It took two attempts before the ball pushed over the centre bottle.
11. For example:



12. a. For example: 'Tennis ball bin bounce' was the most difficult game to play. My data shows that it took nineteen attempts to successfully get the ball into the bin within the time limit.

    b. For example: 'Bottle bowls' was the easiest game to play. My data shows that it took only two attempts to successfully knock over the centre bottle within the time limit.

    c. For example: None of the games were impossible to play (**Note:** If students are unable to complete a game even after repeated attempts, they may identify a game as 'impossible' to play.)

    d. For example: In the games where the pushing force was a roll, the game was easier to complete successfully than the games where the force was a bounce.

    e. For example: 'Bottle bowls' could be made more difficult by moving the bottles further away and arranging them closer together; 'Tennis ball bin bounce' could be made easier by having a bigger bin.

13. No answer required.

Lesson 20

Topic: Testing games

Science in sport

Lesson concepts

- Forces can be exerted by one object on another through direct contact or from a distance
- Science knowledge helps people to understand the effect of their actions
- Ideas and findings can be represented and communicated

Learning alerts

Be aware of students thinking that playing sport is the same as sports science.

Suggested next steps for learning:

Inform students that when sports scientists investigate sports they are doing it to answer a science question or solve a problem by working scientifically. To do this, the sport needs to be played to monitor results.

Lesson notes

In this lesson, students learn about the use of science knowledge in understanding and improving sports performance.

Lesson answers

1. No answer required.
2. No answer required.

3. For example: The force applied to make a javelin travel a long way through the air; the pushing force of kicking in football; the pushing forces of bats in T-ball and cricket; the pulling force on oars in rowing.

4. a. For example: The pushing force from the hand to the shot in shot put; the pushing force to the bobsled; pushing force on pedals in cycling.

   b. The pulling force on the bow in archery; the pulling on the paddles in kayaking; the pulling force on pedals in cycling.

   c. For example: A scientist could examine an athlete's performance and give them advice on how to move their bodies to make their movements more powerful; a scientist could design smoother clothes and streamlined helmets; a scientist could give advice on where a pushing force or a pulling force would be more effective.

5. a. For example: Smoother bowling balls slide more easily over the lane surface and travel faster and further because of decreased friction; swimming caps have smooth surfaces to decrease the friction between the swimmer's head and the water.

   b. For example: The fuzzy surface of a tennis ball increases the friction between the ball and the air; rubber soles on running shoes increase friction, making it safer for the runner to run over uneven surfaces.

6. a. For example: Dancers need to be able to slide over the surface while they are dancing. The smooth surface of the shoe decreases friction between the sole of the shoe and the dancing surface. The padding in pointe shoes would also help the dancer resist the pulling force of Earth when they are on their toes.

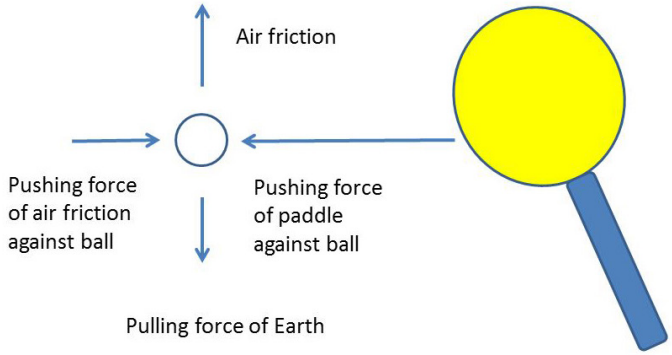
   b. For example: No, dancing shoes would not be suitable for footballers playing on a wet surface as they would be very slippery with the decreased friction. This would mean that the footballers might fall over.

7. a. For example: No, this ball would not be suitable for a bowling ball because it would not slide over the surface or travel very far at all. It would be stopped by the friction between its rough spiky surface and the surface of the bowling lane.

   b. For example: This ball would be good for catching games with a young child. The rough surface would mean there would be a lot of friction between the child's hands and the ball so it would be easy to hold onto and would not slip easily out of the child's hands.

8. a. For example: In the sport of table tennis, the forces involved are the pushing force of the paddle against the ball, the force of air friction and the pulling force of Earth.

   b. For example:



9. No answer required.