DEMYSTIFYING
STEM
WORKBOOK

LEARN HOW THE PRINCIPLES OF STEM POWER THE GAME OF BASKETBALL

PRESENTED BY:
Deloitte
THE MOVEMENT OF A BASKETBALL AROUND THE COURT IS DICTATED BY ITS ENERGY. READ BELOW ABOUT HOW DIFFERENT TYPES OF ENERGY AFFECT A BASKETBALL AND USE THIS INFORMATION TO ANSWER THE QUESTIONS ON THE NEXT PANEL.

<table>
<thead>
<tr>
<th>WHAT IMPACTS A BASKETBALL’S BOUNCE?</th>
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<tbody>
<tr>
<td><strong>HEIGHT</strong></td>
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<tr>
<td>A basketball dropped from 10 feet has more potential energy than a basketball dropped from 5 feet</td>
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<tr>
<td>As a ball drops, it gains speed and the potential energy turns into kinetic energy</td>
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<tr>
<td>The longer the fall, the more kinetic energy and the higher the bounce</td>
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<tr>
<td><strong>SURFACE</strong></td>
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<tr>
<td>Springier surfaces change more as balls land on them</td>
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<tr>
<td>Softer surfaces like a trampoline make a ball bounce higher and faster</td>
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<tr>
<td>Harder surfaces like a basketball court cause a ball to slow down</td>
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<tr>
<td><strong>TEMPERATURE</strong></td>
</tr>
<tr>
<td>Basketballs get warmer as they bounce</td>
</tr>
<tr>
<td>They bounce higher and faster when warmer</td>
</tr>
</tbody>
</table>

3 TYPES OF ENERGY

1. Kinetic-energy of motion
2. Potential-energy based on position
3. Thermal-energy from temperature of matter
MATCHING

<table>
<thead>
<tr>
<th>Kinetic</th>
<th>A basketball held above the ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential</td>
<td>A basketball hitting the ground slightly slows down from friction and heating</td>
</tr>
<tr>
<td>Thermal</td>
<td>A basketball bouncing</td>
</tr>
</tbody>
</table>

TRUE OR FALSE

As a ball falls it begins to lose kinetic energy. T/F

When a basketball hits the ground, it has a lot of kinetic energy. T/F

Potential energy in a basketball turns into both thermal and kinetic energy. T/F

If you drop a basketball and let it bounce, the bounce gets higher and longer. T/F

FILL IN THE BLANK

Because a basketball gains speed as it is dropped, the potential energy is changed into _________. (kinetic energy)

Because springier surfaces act like a trampoline, a ball bounces ________ and _________ when it hits. (higher, faster)

Because air molecules inside a basketball contract when it is colder, a ball that is 60 degrees will bounce ________ and ________ than a ball that is 75 degrees. (lower and slower)

Answers: (1) Kinetic energy (2) Higher, faster (3) Lower, slower
Technology is present in almost every aspect of our lives: phones, laptops, transportation, and even sports. In fact, technology is even present in the design of the WNBA uniforms. Check out the Mystics jersey here to see the specific apparel tech that went into the Nike Women’s Aeroswift Uniforms.

- **WOMEN-SPECIFIC SCAPULA CUTS ON THE**
  Gives the players greater range of motion in their shoulders when they shoot or rebound.

- **CLOSED-HOLE MESH FABRIC WITH QUICK-DRY BACK VENTING**
  Helps regulate body temperature and provides optimal moisture control

- **VARIETY OF UNIFORM LENGTHS AND SHORT RISES**
  Gives players the flexibility to choose whatever matches their style of play

- **VENTS ON THE SHORTS**
  Allows air flow in the shorts so the players sweat less.
Help Aerial Powers power up her robots! The Mystics forward is working on a plan to program a robot to get to the hoop. Help her by figuring out how many spaces the bot has to move and when to turn NORTH, SOUTH, EAST, or WEST so she can score a basket.

**Programming a Robot**

a. Turn
b. Move space(s)
c. Turn
d. Move space(s)
e. Turn space(s)
f. Move space(s)

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Engineering is the use of knowledge and principles from math and science to design, build, and analyze machines, objects, and structures. There are almost 200 types of engineering fields. Engineers help design roads, buildings, tunnels, bridges, robots, cars, spaceships, medicines, and more. Engineers made it possible for the new Entertainment and Sports Arena to be built and serve as the new home court advantage for the Mystics!
Look around the arena and see what makes it unique! Do your best to draw it in the box underneath.
Important Vocab

Parabola - a special curve shaped like an arch. This is the shape a basketball makes when it’s shot through the air. Shooting a basketball in a parabolic arc shape allows it to go high above the rim and enter from above.

Diameter - a straight line passing through the center of a circle. The diameter measures the width of the rim

Acute angle - an angle that is greater than 0 degrees, but less than 90 degrees

Right angle - an angle of 90 degrees, where two perpendicular lines meet

Obtuse angle - an angle that is greater than 90 degrees, but less than 180 degrees
Word Problems

If the rim at the Entertainment and Sports Arena is 18 inches in diameter, and the ball is about 9.1 inches in diameter, about how much wider is the rim than the ball?

Each quarter in a WNBA game is 10 minutes long. After the third quarter, how many minutes have the teams been playing for?

If Kristi Toliver shoots a three-pointer from far away from the hoop, it needs to be shot at a more ________ angle than a Tianna Hawkins layup.

Ariel Atkins gets fouled and goes to the free throw line to shoot. If she has made 42 out of 50 free throws for the season, what is her shooting percentage?

Pax wants to drop a basketball from the Above the Rim ledge and see how high it will bounce. If he originally drops it from 30 feet and it bounces 80% of the way back up, how high will it bounce?

Answers: (1) 8.9 inches (2) 30 minutes (3) acute (4) 84% (5) 24 feet

3-Point Problems

WNBA players have 24 seconds to shoot the ball during every possession. The Mystics are able to make the most of that time by being clutch at three-point shots and lead the league in three-pointers made. See how many three-point problems you can get right in 24 seconds!

8 x 3 = 24  3 x 7 = 21  5 x 3 = 15  17 - 3 = 14  8 + 3 = 11
12/3 = 4  11 - 3 = 8  3 + 9 = 12  18/3 = 6  21 - 3 = 18
3 x 3 = 9  15/3 = 5  3 x 0 = 0  15 - 3 = 12  6/3 = 2
9 x 3 = 27  6 + 3 = 9  10 - 3 = 7  4 x 3 = 12  21/3 = 7
THANK YOU

Deloitte.