# PAWS
# Science
# Grade 4

## Released Items
## With Data

## 2009

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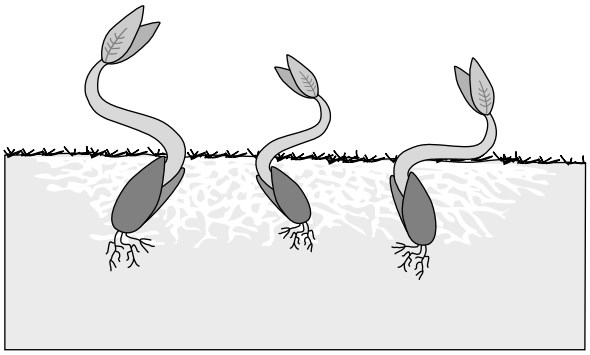
Portions of this work were previously published.

Printed in the United States of America.

# New Plant Growth

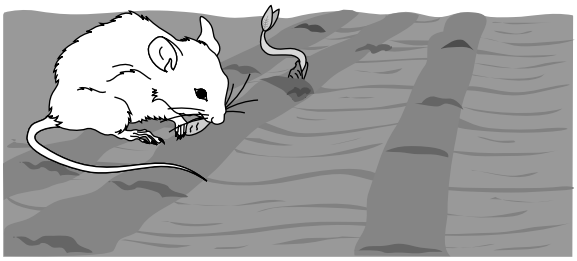
New plants grow from seeds. Some seeds need water before they start to grow, or "sprout."

**Sprouting Seeds: in Wet Soil**



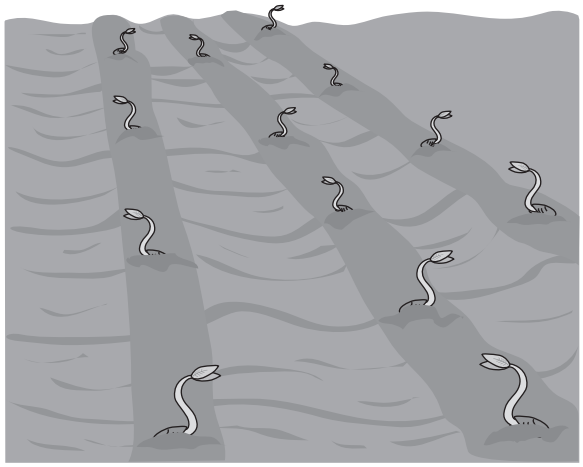
Other seeds need to be bitten or scratched by a bird or an animal before they sprout.

**Sprouting Seeds:**
**Bitten or Scratched by Mice**



Some seeds will sprout only if they have been heated by a fire.

**Sprouting Seeds: Heated by Fire**



Anthony wants to find out what makes some seeds start to grow. His father helps him set up and do these steps:

1. Collect 30 seeds from the same plant.
2. Separate the seeds into three groups of 10 seeds.
3. Heat the first group of seeds in an oven at 350°F for 20 minutes.
4. Use a kitchen knife to scratch each seed in the second group.
5. Put the third group of seeds in a paper cup with water.
6. Wait 24 hours.
7. Find three paper cups that are the same size and fill each halfway with soil.
8. Write the word "Heat" on the first cup. Write "Animal" on the second cup. Write "Water" on the third cup.
9. Place each group of seeds in the correct cup.
10. Observe the seeds for 7 days.
11. Count and record the number of seeds that sprout in each cup.

The results of the activity are shown in the data table.

**Making Seeds Start to Sprout**

| Day | Group 1: Heat | Group 2: Animal | Group 3: Water |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 |
| 4 | 0 | 0 | 1 |
| 5 | 0 | 0 | 3 |
| 6 | 0 | 0 | 4 |
| 7 | 0 | 0 | 2 |

**Which question is Anthony <u>most likely</u> trying to test?**

**A** Can some plants sprout in water instead of dirt?

**B** How long does it take his plant's seeds to sprout?

**C** What conditions do his plant's seeds need to sprout?

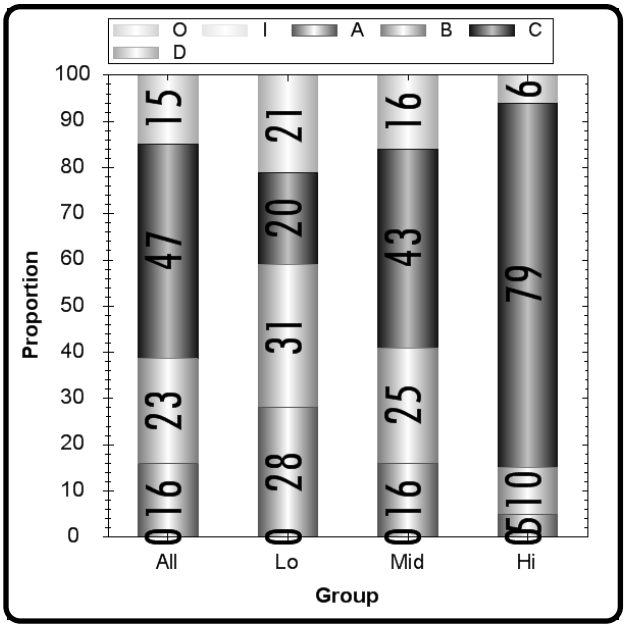
**D** What kind of plants sprout from seeds soaked in water?

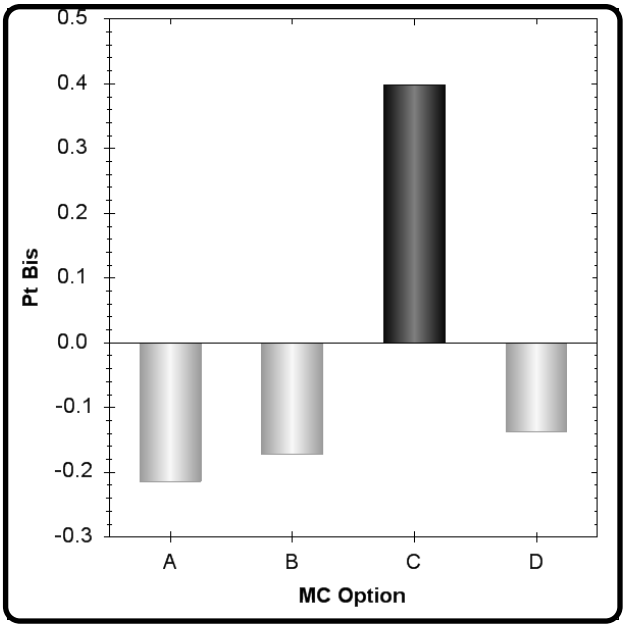
| Grade 4 | Science | CID 3517177 |
|---|---|---|
| Item # 31 | | Administration OP08 |
| | S.04.1.c | |
| | Psg : New Plant Growth | |

| Type | Max Points | Correct Answer | N Count | Item Mean | Discrimination |
|---|---|---|---|---|---|
| Multiple Choice | 1 | C | 6417 | 0.468 | 0.398 |

| | A | B | C | D | Omit | Invalid |
|---|---|---|---|---|---|---|
| All | 16 | 23 | 47 | 15 | 0 | 0 |
| Low Scorers | 28 | 31 | 20 | 21 | 0 | 0 |
| Middle Scorers | 16 | 25 | 43 | 16 | 0 | 0 |
| High Scorers | 5 | 10 | 79 | 6 | 0 | 0 |

| MC Item Option Discriminations | | | |
|---|---|---|---|
| A | B | C | D |
| -0.214 | -0.172 | 0.398 | -0.137 |




Notes:

**Why is it important for Anthony to plant each group of seeds in <u>equal</u> amounts of soil?**

**A** To stop the seeds from spilling out of the cups

**B** To keep the conditions of the activity the same

**C** To make it easy to check the groups all at once

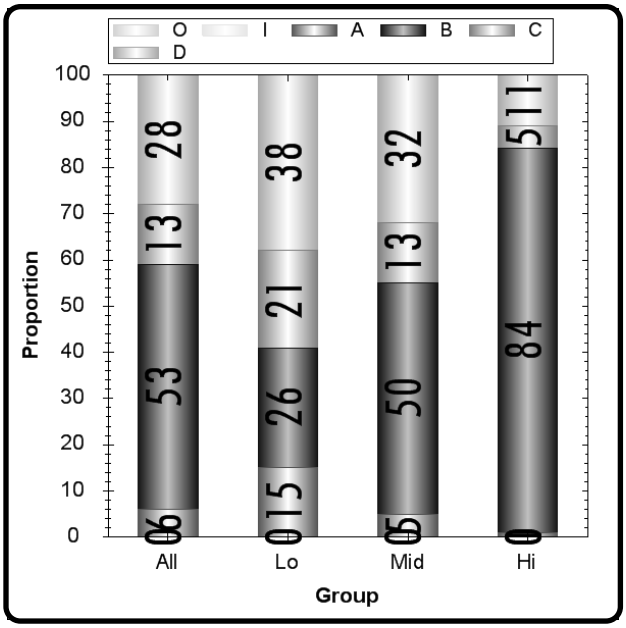
**D** To give the seeds enough room to begin growing

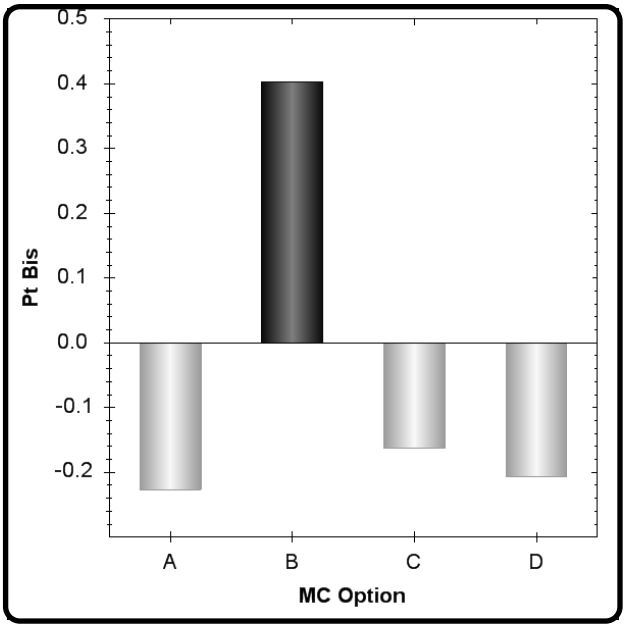
| Grade 4 | Science | CID 3517180 |
|---|---|---|
| Item # 32 | | Administration OP08 |
| | S.04.2.c | |
| | Psg : New Plant Growth | |

| Type | Max Points | Correct Answer | N Count | Item Mean | Discrimination |
|---|---|---|---|---|---|
| Multiple Choice | 1 | B | 6417 | 0.532 | 0.403 |

| | A | B | C | D | Omit | Invalid |
|---|---|---|---|---|---|---|
| All | 6 | 53 | 13 | 28 | 0 | 0 |
| Low Scorers | 15 | 26 | 21 | 38 | 0 | 0 |
| Middle Scorers | 5 | 50 | 13 | 32 | 0 | 0 |
| High Scorers | 1 | 84 | 5 | 11 | 0 | 0 |

| MC Item Option Discriminations | | | |
|---|---|---|---|
| A | B | C | D |
| -0.227 | 0.403 | -0.163 | -0.206 |




Notes:

**How would Anthony's activity have changed if he had checked the seed groups for 3 days instead of 7?**

**A** He could have used fewer seeds.

**B** He could have collected more data.

**C** His conclusion would be less accurate.

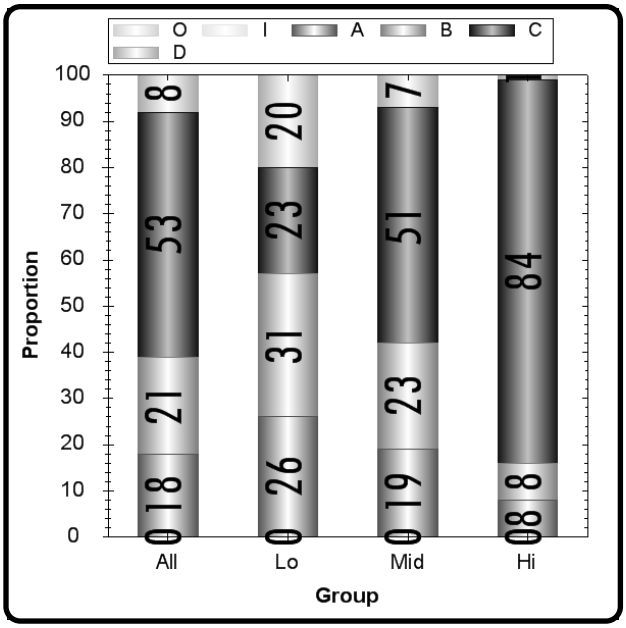
**D** He would have been able to do the activity by himself.

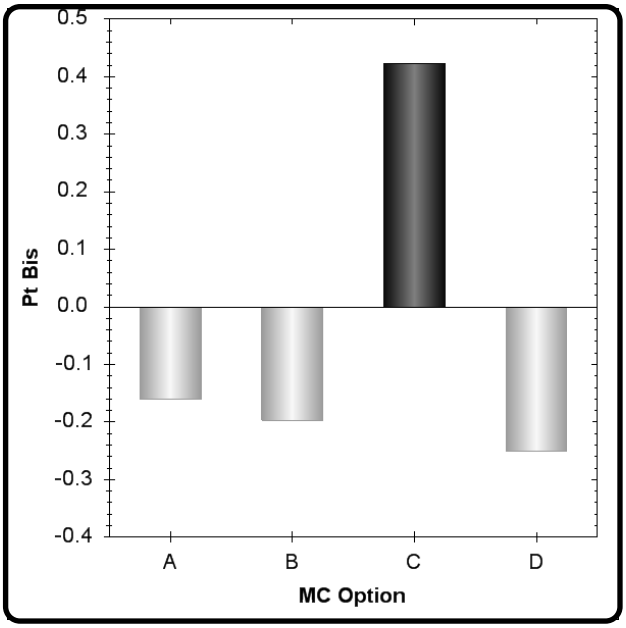
| Grade 4 | Science | CID 3517181 |
|---|---|---|
| Item # 33 | | Administration OP08 |
| | S.04.3.c | |
| | Psg : New Plant Growth | |

| Type | Max Points | Correct Answer | N Count | Item Mean | Discrimination |
|---|---|---|---|---|---|
| Multiple Choice | 1 | C | 6417 | 0.530 | 0.423 |

| | A | B | C | D | Omit | Invalid |
|---|---|---|---|---|---|---|
| All | 18 | 21 | 53 | 8 | 0 | 0 |
| Low Scorers | 26 | 31 | 23 | 20 | 0 | 0 |
| Middle Scorers | 19 | 23 | 51 | 7 | 0 | 0 |
| High Scorers | 8 | 8 | 84 | 1 | 0 | 0 |

| MC Item Option Discriminations | | | |
|---|---|---|---|
| A | B | C | D |
| -0.161 | -0.197 | 0.423 | -0.251 |




Notes:

**What data should Anthony collect to find out which condition is best for seeds to sprout?**

**A** The temperature of the oven that was used

**B** The total number of seeds used in the activity

**C** The size of the paper cup for each group of seeds

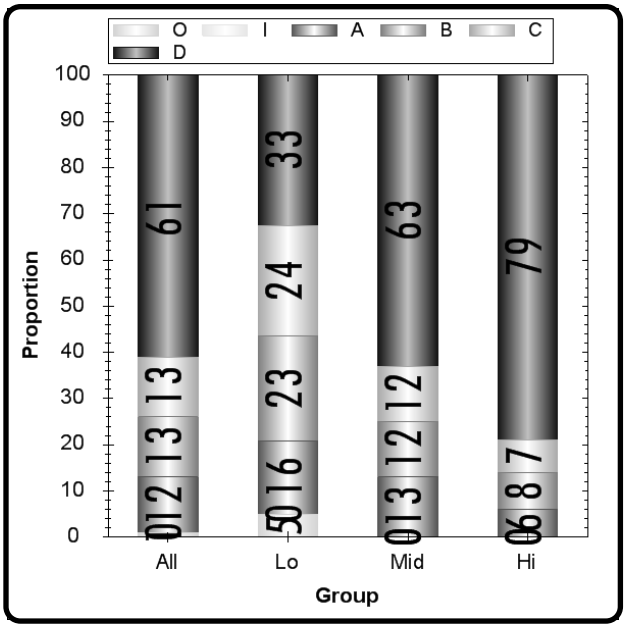
**D** The number of seeds that sprouted in each group

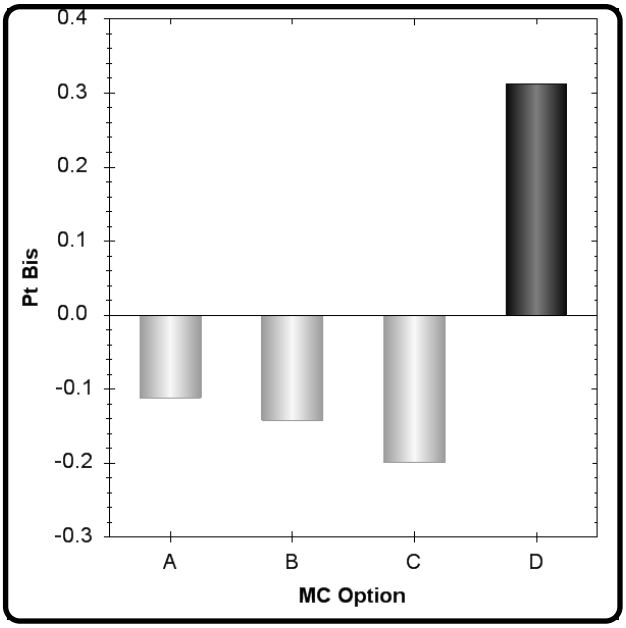
| Grade 4 | Science | CID 3531961 |
|---|---|---|
| Item # 5 | | Administration FT07 |
| | S.04.1.c | |
| | Psg : New Plant Growth | |

| Type | Max Points | Correct Answer | N Count | Item Mean | Discrimination |
|---|---|---|---|---|---|
| Multiple Choice | 1 | D | 775 | 0.612 | 0.313 |

| | A | B | C | D | Omit | Invalid |
|---|---|---|---|---|---|---|
| All | 12 | 13 | 13 | 61 | 1 | 0 |
| Low Scorers | 16 | 23 | 24 | 33 | 5 | 0 |
| Middle Scorers | 13 | 12 | 12 | 63 | 0 | 0 |
| High Scorers | 6 | 8 | 7 | 79 | 0 | 0 |

| MC Item Option Discriminations | | | |
|---|---|---|---|
| A | B | C | D |
| -0.112 | -0.142 | -0.199 | 0.313 |




Notes:

**How would a magnifying glass be helpful to Anthony during this experiment?**

**A** He would be able to give the seeds more light to help them grow.

**B** He would be able to see what was happening underneath the soil.

**C** He would be able to find the temperature of the seeds that were put in the oven.

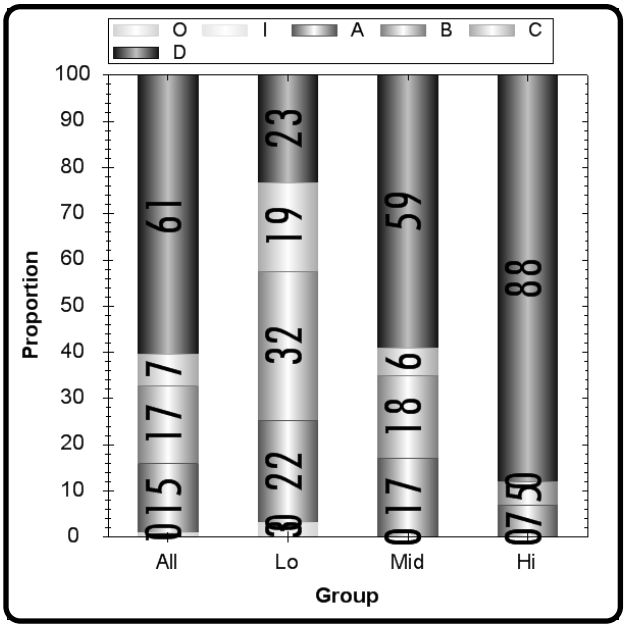
**D** He would be able to count sprouted plants that are too small for him to see.

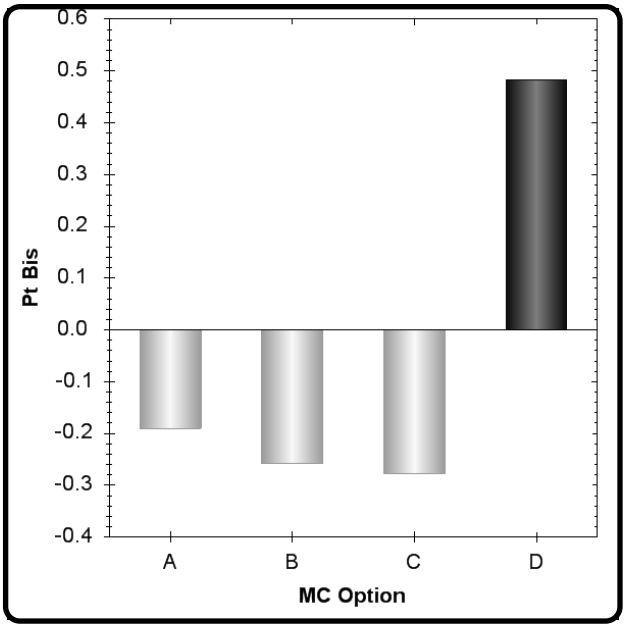
| Grade 4 | Science | CID 3517182 |
|---|---|---|
| Item # 6 | | Administration FT07 |
| | S.04.3.c | |
| | Psg : New Plant Growth | |

| Type | Max Points | Correct Answer | N Count | Item Mean | Discrimination |
|---|---|---|---|---|---|
| Multiple Choice | 1 | D | 781 | 0.608 | 0.483 |

| | A | B | C | D | Omit | Invalid |
|---|---|---|---|---|---|---|
| All | 15 | 17 | 7 | 61 | 1 | 0 |
| Low Scorers | 22 | 32 | 19 | 23 | 3 | 0 |
| Middle Scorers | 17 | 18 | 6 | 59 | 0 | 0 |
| High Scorers | 7 | 5 | 0 | 88 | 0 | 0 |

| MC Item Option Discriminations | | | |
|---|---|---|---|
| A | B | C | D |
| -0.190 | -0.258 | -0.278 | 0.483 |



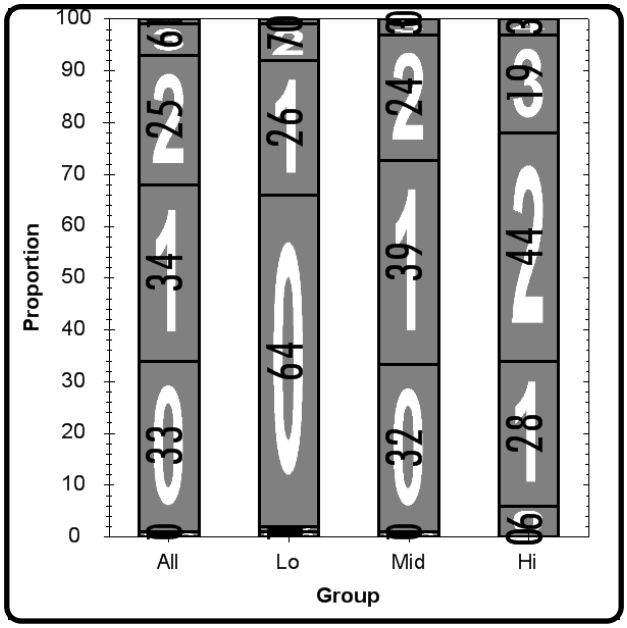

Notes:

**In the space provided, describe an activity Anthony could design to find out which kinds of seeds sprout after being heated.**

| Grade 4 | Science | CID 3517183 |
|---|---|---|
| Item # 47 | | Administration OP08 |
| | S.04.2.c | |
| | Psg : New Plant Growth | |

| Type | Max Points | N Count | Item Mean | Discrimination |
|---|---|---|---|---|
| Open Ended | 4 | 6417 | 1.067 | 0.480 |

| | 0 | 1 | 2 | 3 | 4 | Omit | Invalid |
|---|---|---|---|---|---|---|---|
| All | 33 | 34 | 25 | 6 | 1 | 1 | 0 |
| Low Scorers | 64 | 26 | 7 | 0 | 1 | 1 | 1 |
| Middle Scorers | 32 | 39 | 24 | 3 | 0 | 1 | 0 |
| High Scorers | 6 | 28 | 44 | 19 | 3 | 0 | 0 |




Notes:

521942 1 2 3 4 5 A B C D E Printed in the USA ISD0080