



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2007**

**Grade 7
Mathematics**

NECAP 2007 RELEASED ITEMS
GRADE 7 MATHEMATICS

N&O 6.2 Demonstrates understanding of the relative magnitude of numbers by ordering or comparing numbers with whole number bases and whole number exponents (e.g., 3^3 , 4^3), integers, or rational numbers within and across number formats (fractions, decimals, or whole number percents from 1- 100) using number lines or equality and inequality symbols.



1 Which statement is true?

- A. $\frac{4}{9} > 0.48$
- B. $\frac{3}{16} = 0.48$
- C. $\frac{8}{15} < 0.48$
- D. $\frac{6}{11} > 0.48$

N&O 6.3 Demonstrates conceptual understanding of mathematical operations by describing or illustrating the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g., 3^3 , 4^3); and the effect on the magnitude of a whole number when multiplying or dividing it by a whole number, decimal, or fraction.



2 Let y be a number greater than 0 and less than 1. Which expression has the **greatest** value?

- A. $y \div 2$
- B. $2 \div y$
- C. $y \cdot y$
- D. $2 \cdot y$

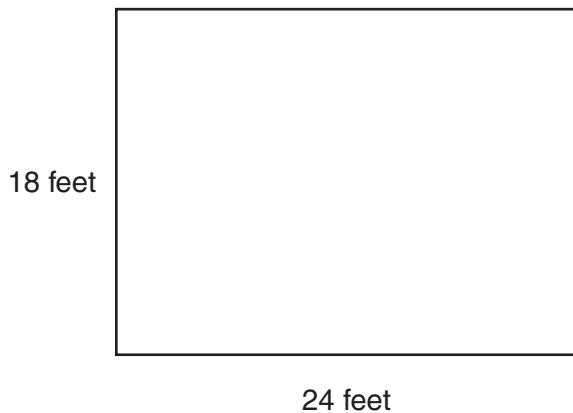
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GRADE 7 MATHEMATICS

N&O 6.4 Accurately solves problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)



- 3 Denise is building a fence around her 18-foot by 24-foot rectangular garden.

Denise's Garden



She will

- put a post at each corner,
- put some posts along the sides, and
- space the posts equally around the garden.

What is the greatest possible distance between each post and the next post?

- A. 8 feet
- B. 6 feet
- C. 3 feet
- D. 2 feet

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G&M 6.3 Uses **properties or attributes** (shape of bases, number of lateral faces, number of bases, number of edges, or number of vertices) to **identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

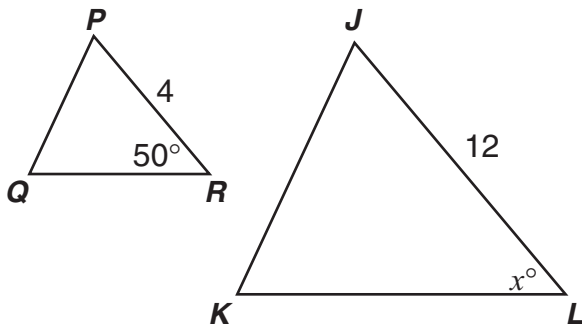
- 4 Lyle made a prism with rectangular bases.
How many **edges** does Lyle's prism have?

- A. 4
- B. 6
- C. 12
- D. 16

G&M 6.5 Demonstrates **conceptual understanding of similarity** by describing the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons, or by solving related problems (including applying scales on maps). Describes effects using models or^{sc} explanations.



- 5 Triangle PQR is similar to triangle JKL ($\triangle PQR \sim \triangle JKL$). The triangles are not drawn to scale.



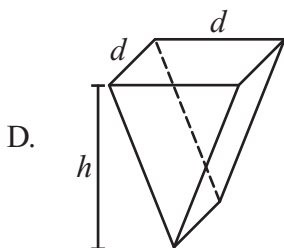
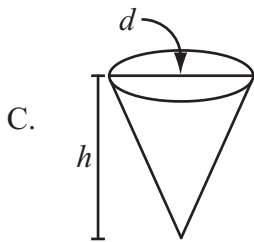
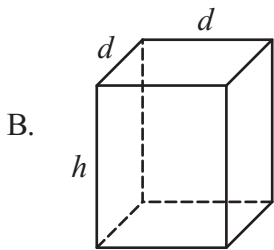
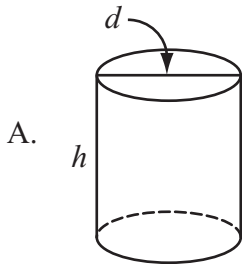
What is the value of x ?

- A. 150
- B. 100
- C. 58
- D. 50

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G&M 6.6 Demonstrates conceptual understanding of perimeter of polygons, the area of quadrilaterals or triangles, and the volume of rectangular prisms by using models, formulas, or by solving problems; and demonstrates understanding of the relationships of circle measures (radius to diameter and diameter to circumference) by solving related problems. Expresses all measures using appropriate units.

6 Which container below holds the most water?



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G&M 6.7 Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems across the content strands.

7 Gloria's couch is 87 inches long. How long, in feet, is Gloria's couch? [1 foot = 12 inches]

A. $7\frac{1}{4}$ feet

B. $7\frac{7}{12}$ feet

C. $8\frac{7}{10}$ feet

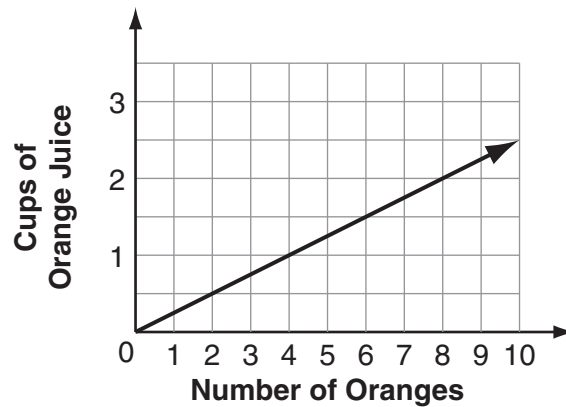
D. $8\frac{3}{4}$ feet

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F&A 6.1 Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; or writes a rule in words or symbols for finding specific cases of a linear relationship; or writes a rule in words or^{sc} symbols for finding specific cases of a nonlinear relationship; and writes an expression or^{sc} equation using words or^{sc} symbols to express the generalization of a linear relationship (e.g., twice the term number plus 1 or^{sc} $2n + 1$).



- 8** This graph shows the number of cups of orange juice that can be made from different numbers of oranges.



Which table shows the same relationship as the graph?

A.

Number of Oranges	Cups of Orange Juice
1	2
2	4
3	6
4	8

C.

Number of Oranges	Cups of Orange Juice
1	4
2	8
3	12
4	16

B.

Number of Oranges	Cups of Orange Juice
2	1
4	2
6	3
8	4

D.

Number of Oranges	Cups of Orange Juice
4	1
8	2
12	3
16	4

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F&A 6.2 Demonstrates conceptual understanding of linear relationships ($y = kx$; $y = mx + b$) as a constant rate of change by constructing or interpreting graphs of real occurrences and describing the slope of linear relationships (faster, slower, greater, or smaller) in a variety of problem situations; **and describes how change in the value of one variable relates to change in the value of a second variable in problem situations with constant rates of change.**

- 9 This chart shows the target heart rate for people of different ages.

Target Heart Rate

Age	Target
20	160
30	152
40	144
50	136
60	128

When a person's age increases **one year**, by how much does the target heart rate decrease?

- A. 0.8
- B. 1.25
- C. 8
- D. 10

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F&A 6.4 Demonstrates conceptual understanding of equality by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a , b , and c are whole numbers with $a \neq 0$.

10 Look at these number sentences.

$$\square + \triangle + \triangle = 11$$

$$\square + \square + \square = 9$$

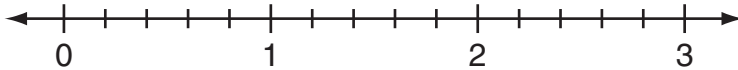
Each \square represents the same number. Each \triangle represents the same number. What is the value of $\square + \triangle$?

- A. 5
- B. 6
- C. 7
- D. 8

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11 Look at this number line.



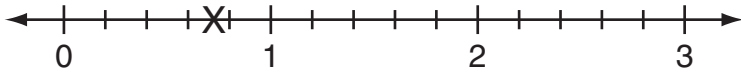
Use an X to label 0.75 on the number line.

Scoring Guide

Score	Description
1	Student identifies any location on the number line between 0.6 and 0.8.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

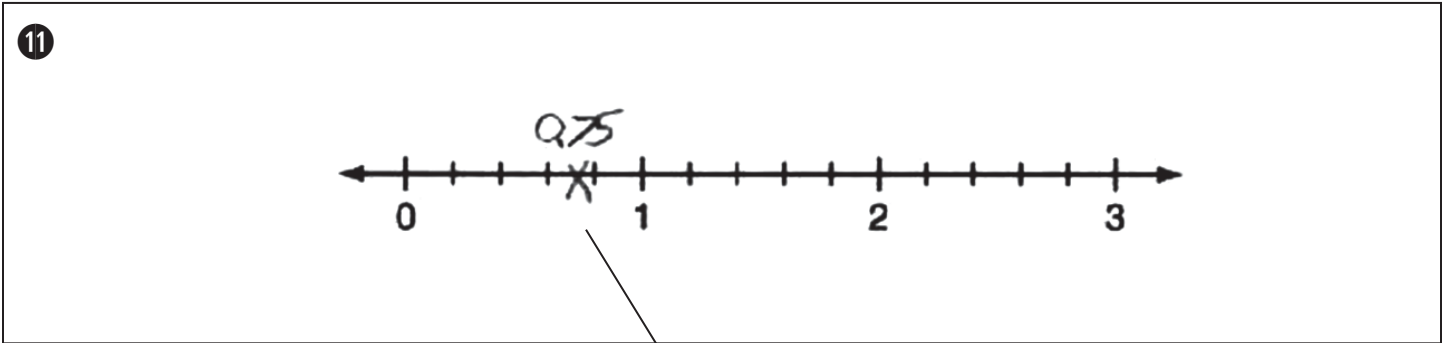
Note: Accept any mark in place of the “X.”

Sample Response:



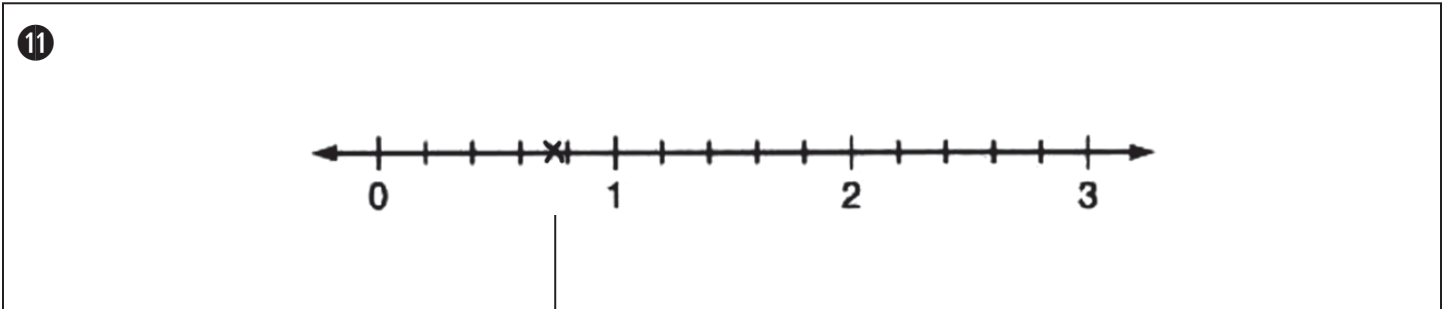
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SCORE POINT 1
(EXAMPLE A)



Student's response is correct. (Labeling the point with 0.75 is not required.)

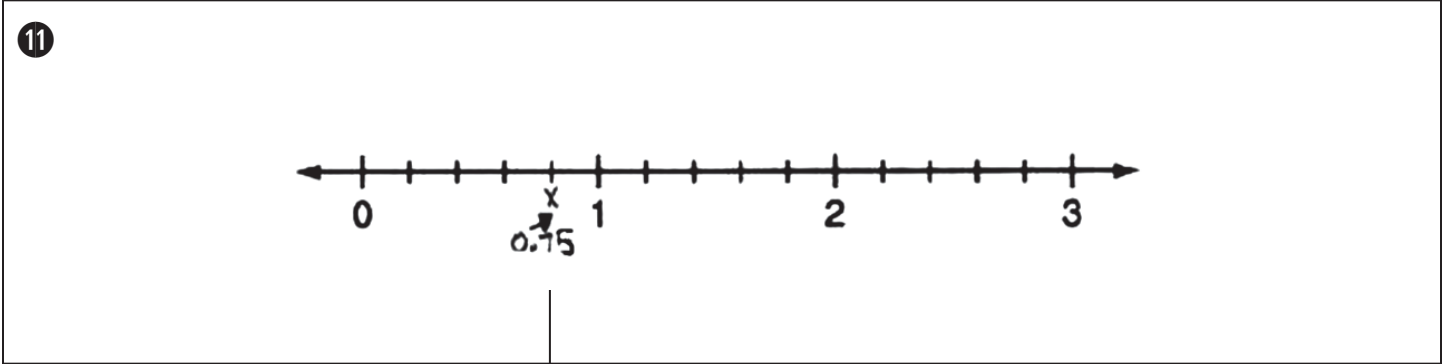
SCORE POINT 1
(EXAMPLE B)



Student's response is correct.

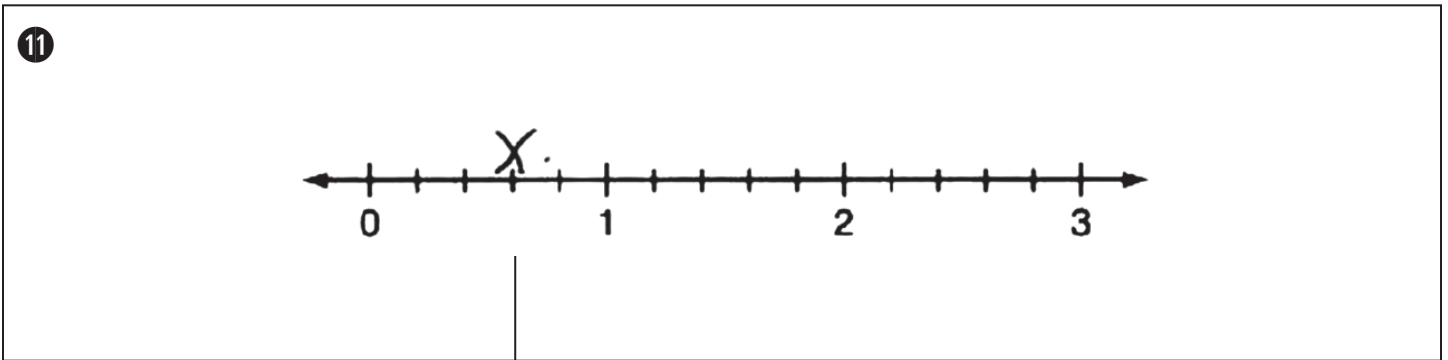
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SCORE POINT 0
(EXAMPLE A)



Student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)



Student's response is incorrect.

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G&M 6.1 Uses **properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish** among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).




- 12 The lengths of two sides of an **isosceles** triangle are 5 meters and 7 meters. What are all the possible lengths, in meters, of the third side?

Scoring Guide

Score	Description
1	Student gives correct answer, 5 and 7 , with no incorrect lengths.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response




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SCORE POINT 1
(EXAMPLE A)

 12 The lengths can be 5m or 7m.

Student's answer is correct. (Note: Unit of measure is not required.)

SCORE POINT 1
(EXAMPLE B)

 12   only 2

Student's answer is correct. (Correct answer is indicated through picture; indicating "only 2" is not necessary.)

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SCORE POINT 0
(EXAMPLE A)



12

It think it would be 7 meters.

Student does not include all possible lengths.

SCORE POINT 0
(EXAMPLE B)



12

possible: 9, 7, 5, 3, 6

Student's answer contains lengths that are incorrect.

**NECAP 2007 RELEASED ITEMS
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N&O 6.4 Accurately solves problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple. (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)



- 13** The correct price of a CD at a store is \$8.99. The CDs were incorrectly sold for \$8.75 each. If 100 CDs were sold at the incorrect price, how much money did the store lose altogether?

Scoring Guide

Score	Description
2	Student gives correct answer, \$24.00 .
1	Student's answer is incorrect or missing with indication of correct strategy.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response


Sample Response:

Each CD is off by $\$8.99 - \$8.75 = \$0.24$,

$100 \times \$0.24 = \24.00 .

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SCORE POINT 2
(EXAMPLE A)

 13


$$\begin{array}{r} \$0.99 \\ - \$0.75 \\ \hline 24 \end{array}$$

$$\begin{array}{r} 100 \\ \times 24 \\ \hline 400 \\ + 2000 \\ \hline 2400 \end{array}$$

Total amount lost - \$24.00


Student's answer is correct. (Showing work is not required.)

SCORE POINT 2
(EXAMPLE B)

 13

\$24.00


(Yes the artwork is necessary).



Student's answer is correct.

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SCORE POINT 1
(EXAMPLE A)

13 

$$\begin{array}{r} \$8.99 \\ - \$0.75 \\ \hline \$0.34 \end{array}$$


$$\begin{array}{r} 100 \\ \times .34 \\ \hline \$34.00 \end{array}$$

$\$34$

They lost \$34 in sales.

Student's answer is incorrect, with indication of correct strategy.

SCORE POINT 1
(EXAMPLE B)

13 

They lost \$2.40 in the mistake.

$$\begin{array}{r} 8.99 \\ \times 100 \\ \hline 89.90 \end{array}$$

$$\begin{array}{r} 8.75 \\ \times 100 \\ \hline 87.50 \end{array}$$

$$\begin{array}{r} 89.90 \\ - 87.50 \\ \hline \$2.40 \end{array}$$

Student's answer is incorrect, with indication of correct strategy.

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SCORE POINT 0
(EXAMPLE A)

 13

The store lost \$240.00

Student's answer is incorrect, with no indication of correct strategy.

SCORE POINT 0
(EXAMPLE B)

 13

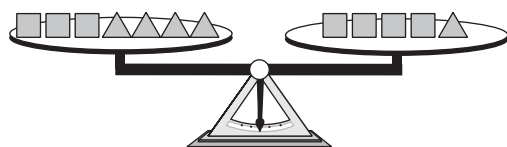
$$\begin{array}{r} 8.75 \$ \\ - 100 \\ \hline 7.75 \$ \end{array}$$
 the store lost.

Student's answer is incorrect, with no indication of correct strategy.

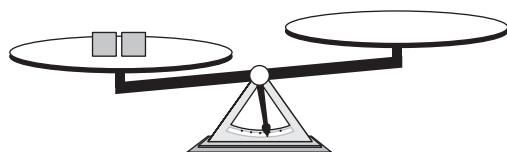
**NECAP 2007 RELEASED ITEMS
GRADE 7 MATHEMATICS**

F&A 6.4 Demonstrates conceptual understanding of equality by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–6–3), solving multi-step linear equations of the form $ax \pm b = c$, where a , b , and c are whole numbers with $a \neq 0$.

- 14 The scale shown below is balanced.



How many triangles should be put on the right side of the scale below so that it balances? Explain your answer.



Scoring Guide

Score	Description
2	Student gives correct answer, 6 (triangles), with sufficient explanation given or work shown to indicate correct strategy.
1	Student gives correct answer. OR Student gives two correct balance relationships between squares and triangles, but does not give the required one. OR Student gives incorrect answer, with indication of some correct strategy.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

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Sample Responses:

- 2 points for drawing that shows 6 triangles balances 2 squares
 or
 for “6 because I took off the same amount from both sides”
 OR
- 1 point for drawing of 6 triangles
 or
 for drawing of 1 square and 3 triangles

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SCORE POINT 2
(EXAMPLE A)

14


$$\square\square\square\triangle\triangle\triangle = \square\square\square\square$$

$$\square = 3\triangle$$

$$\square\square = \triangle\triangle\triangle\triangle\triangle\triangle$$

6 triangles

Student's answer is correct,
with work shown that
indicates correct strategy.

SCORE POINT 2
(EXAMPLE B)

14

6 triangles should be put on
the right side of the balance
because

$$\square\square\square\triangle\triangle\triangle = \square\square\square\square\triangle$$

both have at least 3 squares and
one triangle take it away and
you get $\triangle\triangle\triangle = \square$

Student's answer is correct,
with explanation that indicates
correct strategy.

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SCORE POINT 1
(EXAMPLE A)

14

6 triangles

Student's answer is correct,
with no explanation given or
work shown.

SCORE POINT 1
(EXAMPLE B)

14

3 triangles is one square

Student shows a correct
balance relationship, but not
the required one.

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SCORE POINT 0
(EXAMPLE A)

14

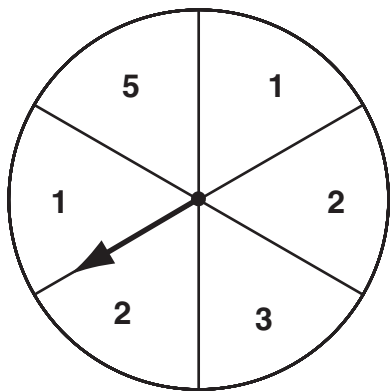
4 because triangles are about half
of the squares.

Student's answer is
incorrect.

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DSP 6.5 For a probability event in which the sample space may or may not contain equally likely outcomes, determines the experimental or theoretical probability of an event in a problem-solving situation.

- 15 Pat and Ron are making rules for a game using this spinner.



Rule 1: If the arrow lands on an even number, Pat gets one point.

Rule 2: If the arrow lands on an odd number, Ron gets one point.

- What is the probability that Pat gets one point on a spin?
- A game is fair when both players have equal chances of getting one point. Explain why this is **not** a fair game.

Pat and Ron keep Rule 1 the same but want a new Rule 2.

- Write a new Rule 2 to make the game fair. **Do not change** the numbers on the spinner. Explain how your rule makes the game fair.

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GRADE 7 MATHEMATICS**

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point OR Student shows minimal understanding of probability.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point for correct answer, $\frac{2}{6}$ or **equivalent** (e.g., $\frac{1}{3}$ or 0.33 or 33%)

Part b: 1 point for correct explanation

Part c: 2 points for correct rule and explanation

OR

1 point for a rule that results in a fair game (e.g., student changes rule 1), without adequate explanation

or

for an explanation that shows correct reasoning, but rule may be missing, incorrect, or unclear

Sample Responses:

Part a: $\frac{2}{6}$ or $\frac{1}{3}$ or 0.33 or 33% or equivalent

Part b: It is not fair because Ron has a greater chance of winning. He can win on 4 sections but Pat can win on only 2.

Part c: Rule 2 (new): Ron gets 1 point if the arrow lands on 3 or 5. This is fair because the probability that either one gets a point on a spin is the same, $\frac{2}{6}$ or $\frac{1}{3}$.

OR

Ron gets 1 point if the arrow lands on 1. Nobody gets a point if the spinner lands on 3 or 5. This is fair because the probability that either one gets a point on a spin is the same, $\frac{2}{6}$ or $\frac{1}{3}$.

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SCORE POINT 4
 (EXAMPLE A)

15

$0.33\frac{1}{3}\%$

a) Student's answer is correct. (1 point)

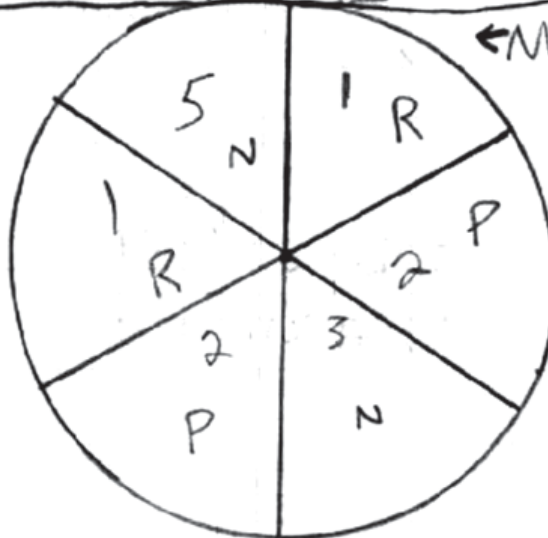
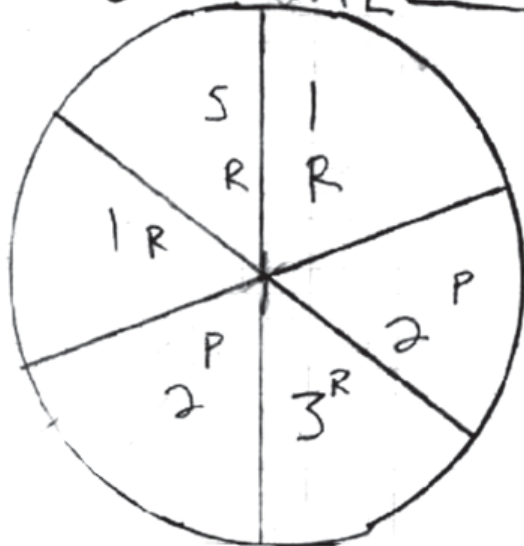
b) Student's explanation is correct. (1 point)

$2/6 = 1/3 = 33\frac{1}{3}\%$

b. Pat has a $33\frac{1}{3}\%$ chance of getting a point, whereas Ron has a $66\frac{2}{3}\%$ chance.

c. If the arrow lands on a 1, Ron gets a point. That way, it's a $33\frac{1}{3}\%$ chance that Pat gets a point, a $33\frac{1}{3}\%$ chance that Ron gets a point, and a $33\frac{1}{3}\%$ chance that nobody gets it.

ORIGINAL



← MINE

P - Pat's point
 R - Ron's point
 N - nobody

c) Student's rule is correct and explanation is sufficient. (2 points)

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SCORE POINT 3
(EXAMPLE A)

15

a) Student's answer is incorrect. (0 points)

a 1 to 2

b This is not a fair game because Ron has a better probability than Pat at getting a point.
c. If Ron lands on a number over 2, he gets a point. This makes the game fair because on the board there are just as many numbers over 2 as there are even.

pat = even
Ron = odd

c) Student's rule is correct and explanation is sufficient. (2 points)

b) Student's explanation is correct. (1 point)

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SCORE POINT 3
(EXAMPLE B)

15

a) Student's answer is correct. (1 point)

a) The probability that Pat gets a point is 2 out of 6 ($\frac{2}{6}$)

b) This is not a fair game because there is more odd numbers on the spinner so it is highly unlikely Pat will win,

c) Rule 2: IF Ron lands on a 1, he gets one point,

b) Student's explanation is correct. (1 point)

c) Student's rule is correct but explanation is insufficient. (1 point)

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SCORE POINT 2
(EXAMPLE A)

15

a) The chances are he probably won't.

a) Student's answer is incorrect. (0 points)

b) Pat has only 2 spots where he can get a point and Ron has 4 spots.

b) Student's explanation is correct. (1 point)

c) If Ron lands on a 1 he gets a point.

c) Student's rule is correct but explanation is insufficient. (1 point)

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SCORE POINT 2
(EXAMPLE B)

15

A: 2 out of 6

a) Student's answer is correct. (1 point)

B: This is not a fair game because there are more even numbers than odd.

C. If the draw lands on a 1, Ben gets a point

b) Student's explanation is incorrect. (0 points)

c) Student's rule is correct but explanation is insufficient. (1 point)

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SCORE POINT 1
(EXAMPLE A)

15

a) 4:1

a) Student's answer is incorrect. (0 points)

b) Pat has 4 chances to win
Ron has only 2.

c) If the spinner lands on 5 or 3 the person gets 4 points.

b) Student's explanation is incorrect. (0 points)

c) Student's rule is correct but explanation is insufficient. (The original rule 2 referred to Ron, so the rule in the student's response is taken as referring to Ron.) (1 point)

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SCORE POINT 0
(EXAMPLE A)

15

may be pot should have 2 spins and she will have 4 points.

a) Student's answer is incorrect. (0 points)

maybe they can take turnings taking spinning:

I think that they shouldn't play the game until the game is fair.

b) Student's explanation is incorrect. (0 points)

c) Student's rule and explanation are irrelevant to the concept being measured. (0 points)