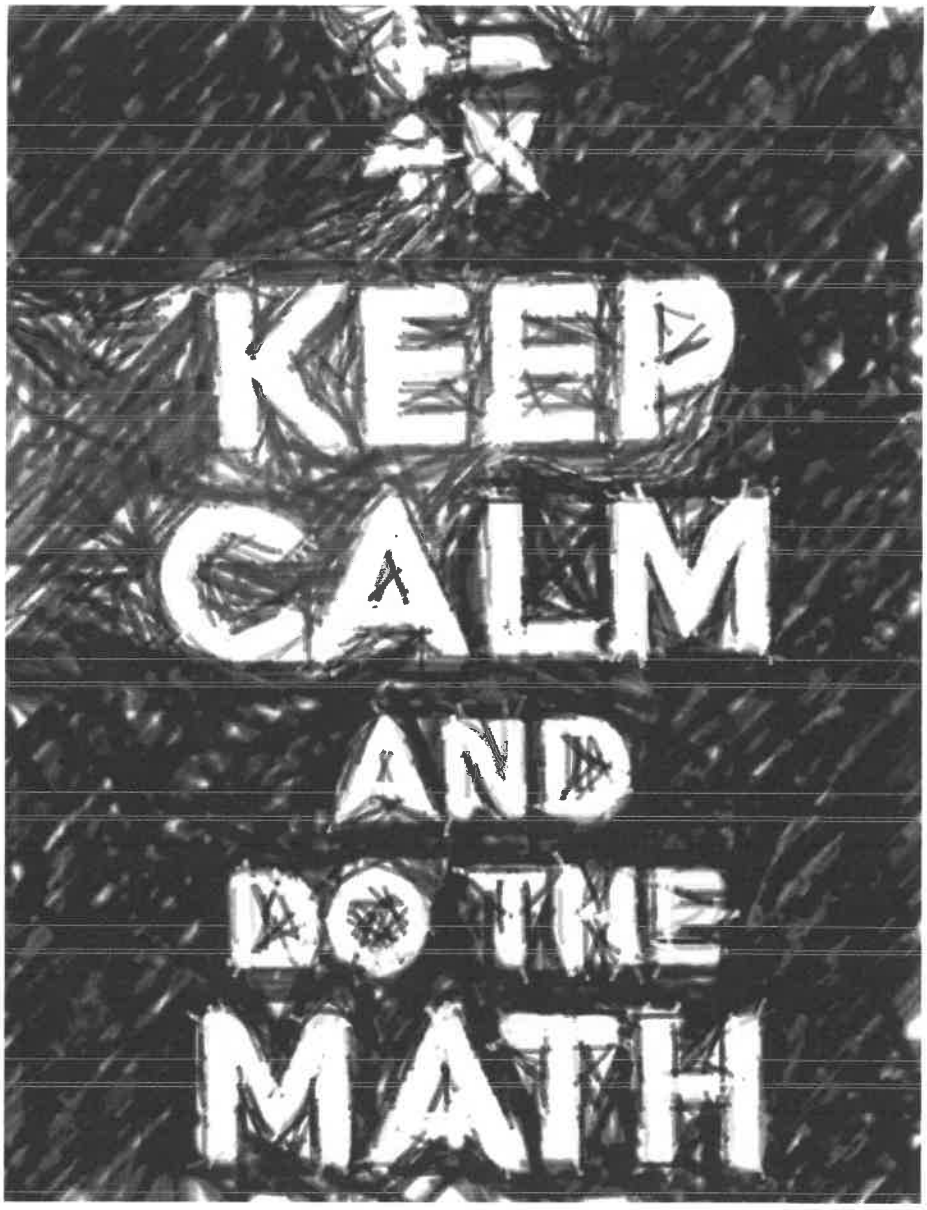
NAME: _____

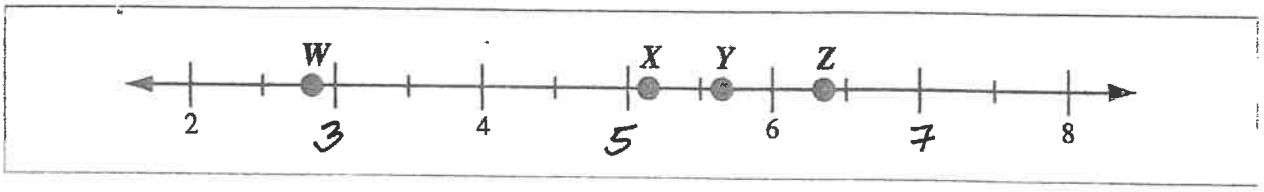
Math P.A.T. Prep

Perfect and Non-Perfect Squares
Square Roots – Approx. Square Roots - SOLUTIONS



St. Brendan School

Mr. Martínez



Numerical Response

6. Match each point on the number line above to the corresponding number in the table below.

	Code	Number	
	1	$\sqrt{37}$	a little above 6
W ←	2	$\sqrt{8}$	a little below 9
	3	$\sqrt{22}$	a bit below 5 (4.7)
Z ←	4	$\sqrt{41}$	closer to 6 than 7 → y
	5	$\sqrt{6}$	2. something
	6	$\sqrt{50}$	very close to 7
X ←	7	$\sqrt{27}$	very close to 5 but a little less than 6
y ←	8	$\sqrt{32}$	

Code: 2 7 8 4
Point: W X Y Z

(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)

STRATEGY

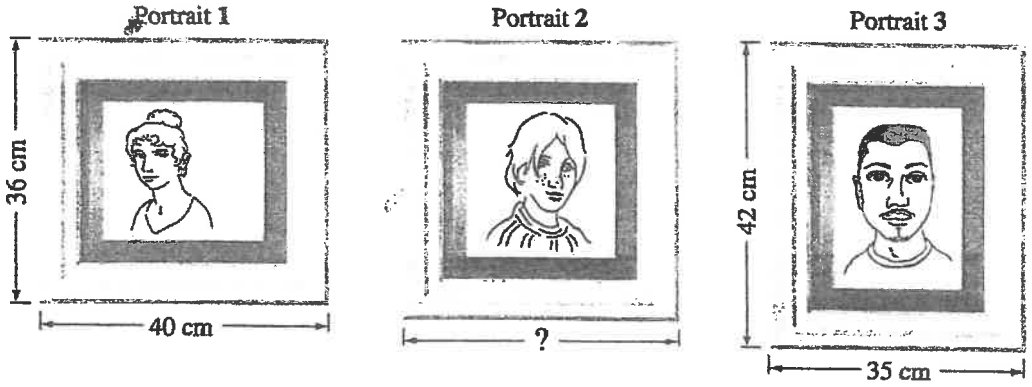
- On the number line, as you can see, are "SQUARE ROOTS!!
- Recognize that:

$2 = \sqrt{4}$ $\quad 5 = \sqrt{25}$
$3 = \sqrt{9}$ $\quad 6 = \sqrt{36}$
$4 = \sqrt{16}$ $\quad 7 = \sqrt{49}$

- $\sqrt{37}$ → between 6 and 7 → has to be point W
- $\sqrt{8}$ → between 2 and 3, very close to 3 → W
- $\sqrt{22}$ → between 4 and 5, closer to 5
- $\sqrt{41}$ → between 6 and 7, almost in the middle, closer to 6 → closer to Z
- $\sqrt{6}$ → between 2 and 3, almost in the middle, closer to 2
- $\sqrt{50}$ → between 7 and 8, very close to 7 → has to be X
- $\sqrt{27}$ → between 5 and 6, very close to 5 → has to be Y
- $\sqrt{32}$ → between 5 and 6,

Use the following information to answer numerical-response question 6.

Pat arranges three portraits from smallest to largest based on area. Portrait 2 is square, and its side length, measured in centimetres, is a whole number.



Numerical Response

6. The side length of portrait 2 is 36 cm.

(Record your answer in the numerical-response section on the answer sheet.)

- IMPORTANT information TO WRITE down / note → PORTRAIT 2 is a square
  ↓
  This means a PERFECT SQUARE

- thus, the area of PORTRAIT is a square number between the AREA of P. 1 and the AREA of P.3

- Area of Portrait 1 = $b \times h = (36 \times 40)\ cm^2 = 1440\ cm^2$

- Area of Portrait 3 = $b \times h = (35 \times 42)\ cm^2 = 1470\ cm^2$

- NOTICE: the only number that's a perfect square between 35 and 40 is 36.
  thus → the side length of PORTRAIT 2 is 36 cm

The letters p and q in the expression $\sqrt{\frac{p+q}{2}}$ represent consecutive perfect square numbers.

3. Which of the following number lines **best** represents the value of $\sqrt{\frac{p+q}{2}}$?

A.

B.

C.

D.

- Key word → Consecutive → "following each other"
- "consecutive perfect squares" means any perfect squares that follow each other:
- Remember: Perfect squares → 1, 4, 9, 16, 25, 36, 49...
- Use any 2 consecutive perfect squares

→ 1 and 4 → p = 1, q = 4

- $\sqrt{\frac{p+q}{2}} = \sqrt{\frac{1+4}{2}} = \sqrt{\frac{5}{2}} = \sqrt{2.5}$

1 to 2.5 → 1.5

2.5 to 4 → 1.5

So it is exactly in the middle

4 and 9 → p = 4, q = 9

$\sqrt{\frac{4+9}{2}} = \sqrt{\frac{13}{2}} = \sqrt{6.5}$

4 to 6.5 → 2.5

6.5 to 9 → 2.5

Use the following information to answer question 1.

$\sqrt{51}$ $\sqrt{55}$ $\sqrt{61}$ $\sqrt{66}$ $\sqrt{71}$ $\sqrt{77}$ $\sqrt{81}$ $\sqrt{88}$

1. How many of the square roots shown above have a value that is between 7.8 and 8.8?

A. 2
B. 3
C. 4
D. 5

Strategy 1
7.8 → almost 8, so its square is close to 64 (8×8)
8.8 → almost 9, so its square is close to 81 (but not higher or equal)

Strategy 2 → find square roots of each
$\sqrt{51} = 7.14$ $\sqrt{55} = 7.41$ $\sqrt{61} = 7.81$ $\sqrt{66} = 8.12$ $\sqrt{71} = 8.42$ $\sqrt{77} = 8.77$

The square roots of two rational numbers are represented on the number line shown below.

5. If Q is located between points P and R on the number line above, then which of the following square roots could **not** represent Q?

A. $\sqrt{\frac{324}{81}} = \sqrt{4} = 2$
B. $\sqrt{\frac{256}{9}} = 5.\overline{3}$
C. $\sqrt{\frac{225}{64}} = 1.875$
D. $\sqrt{\frac{169}{4}} = 6.5$

- $\sqrt{\frac{64}{100}} = \frac{8}{10} = 0.8$
- $\sqrt{\frac{841}{25}} = \frac{29}{5} = 5.8$
- Looking for a $\sqrt{}$ outside of the 0.8 – 5.8 range

Strategy
↳ find the square roots

Numerical Response

10. The number of perfect squares that are whole numbers between 2 and 20 is 3.

(Record your answer in the numerical-response section on the answer sheet.)

- Be careful: "number of perfect squares", NOT which ones.
- List them: 1 ④ ⑨ ⑯ 25

22. In estimating $\sqrt{70}$, which two perfect square numbers provide the best two benchmarks to estimate your answer?

A. 49 and 64 (too low)
B. 64 and 100 (too high)
C. 49 and 81
D. 64 and 81

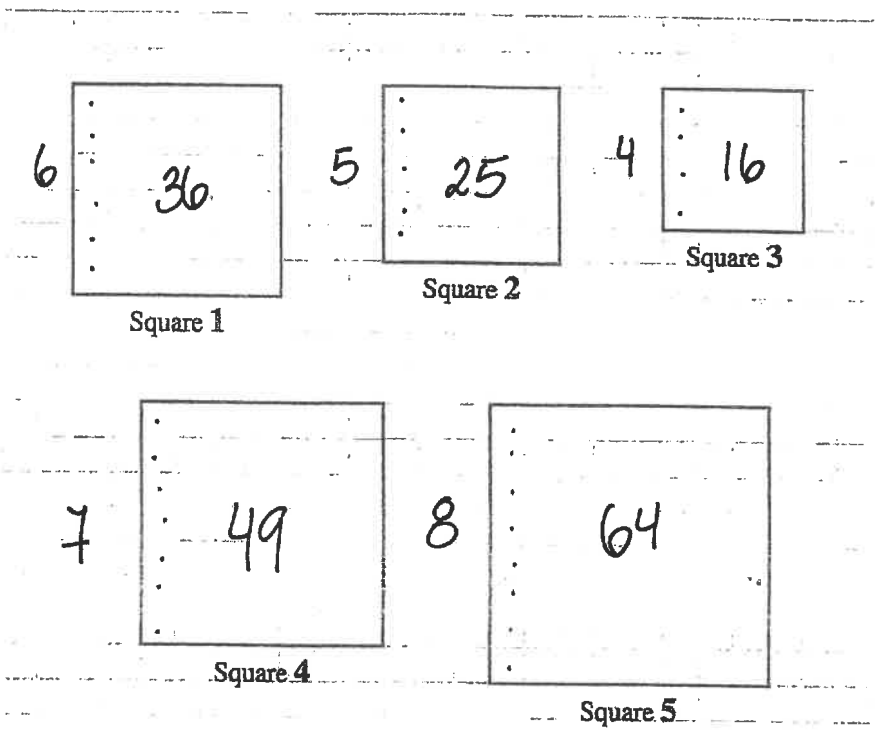
Benchmarks → known perfect squares
↳ before 70 and after 70

$\sqrt{64}$ and $\sqrt{81}$ ← $\sqrt{70}$

STRAND: NUMBER SENSE

COMPLEXITY: LOW

Use the following information to answer numerical-response question 10.



Numerical Response

10. Which two squares shown above represent the **best** benchmarks for estimating the value of $\sqrt{43}$?

Answer: Square 1 and Square 4

(Record **both digits** of your answer **in any order** in the numerical-response section on the answer sheet.)

- Since 43 is between 36 and 49
- then $\sqrt{36} < \sqrt{43} < \sqrt{49}$, i.e. $6 < \sqrt{43} < 7$

Square 1 and Square 4