Math 10C

L01 – 4.1 Square Roots and Cube Roots

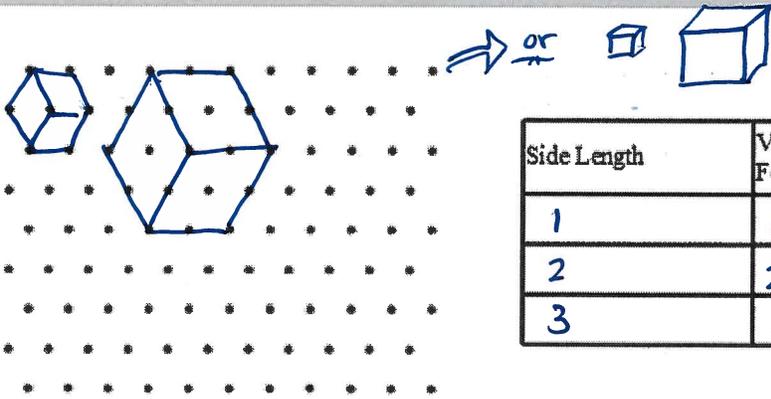### Part 1 – Review of Squares
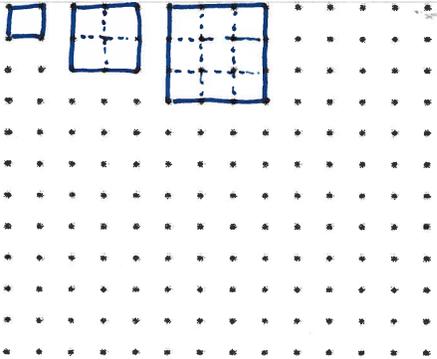
Side Length	Area in Exponential Form	Area
1	$1 \times 1 = 1^2$	1
2	$2 \times 2 = 2^2$	4
3	$3 \times 3 = 3^2$	9

What is a Perfect Square? *A square with whole number side lengths.*
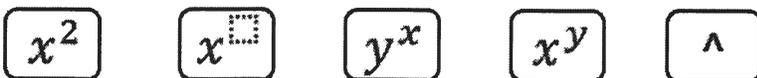
Part 2 – Review of Cubes

Side Length	Volume in Exponential Form	Volume
1	$1 \times 1 \times 1 = 1^3$	1
2	$2 \times 2 \times 2 = 2^3$	8
3	$3 \times 3 \times 3 = 3^3$	27

What is a Perfect Cube? *A cube with whole number side lengths.*

Part 3 – Using your calculator to Square and Cube a Number

The calculator button… find one of the following buttons on your calculator.

x^2 $x^{\square}$ y^x x^y $\wedge$

Example: What is 3^2?

$3 \boxed{y^x} 2 = 9$

NOTE: Check to make sure every student is getting 9 for the answer.

Math 10C

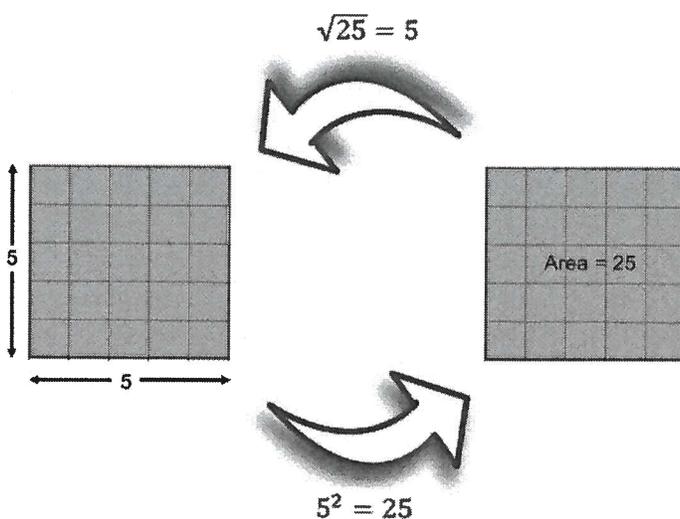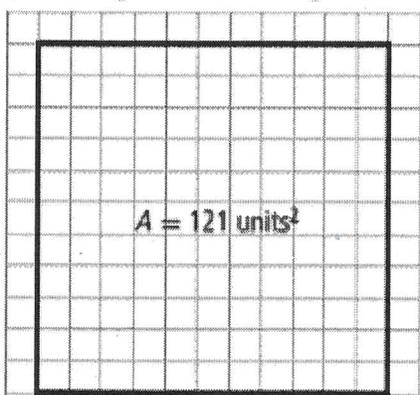**Q1:** Try to answer the following questions. Write down how you enter them into your calculator.
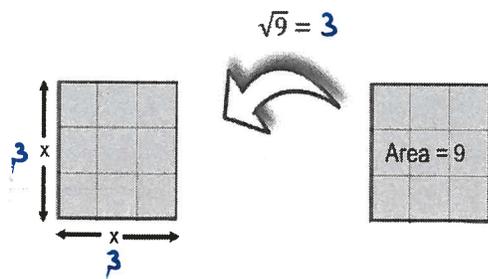
5^2

25

7^2

49

5^3

125

16^3

4096

Part 4 – Square Roots

Q2: What is the side length of the square?

$A = 121$ units²

$\sqrt{25} = 5$

5

Area = 25

$5^2 = 25$

Q3: Calculate the unknown value in each case:

4

4

Area = 16

$4^2 = 16$

$\sqrt{9} = 3$

3 x

x
3

Area = 9

Key
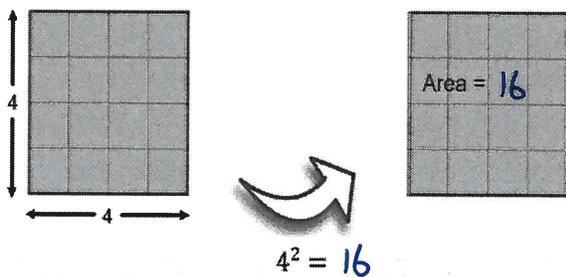
Q4: Complete the following tables:

Side Length of Square	Area of Square
5	25
7	49
2.846...	8.1

Side Length of Square	Area of Square
2	4
5.196...	27
7.348...	54

Part 5 – Cube Roots

$$3^3 = 27$$
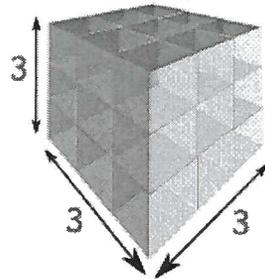
$$\sqrt[3]{27} = 3$$

Q5: Complete the following tables:

Side Length of Square	Area of Square
4	16
6	36
5.2	27.04

Side Length of Cube	Area of Cube
3.1	29.791
3	27
3.7325...	52

KEY

Part 6 – Factor Trees

54

6   9

(2) (3)   (3) (3)

$54 = 2 \times 3 \times 3 \times 3$

64

8   8

(2) 4   (2) 4

(2) (2)   (2) (2)
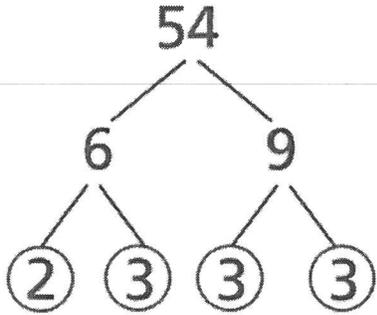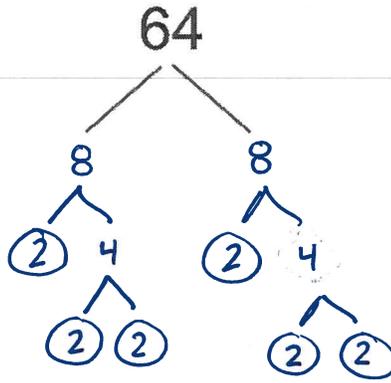
$64 = 2^6$

Q6: Prime factoring the following numbers:

22

(2) (11)

$22 = 2 \times 11$

36

6   6

(2) (3) (2) (3)

$36 = 2^2 \times 3^2$

81

9   9

(3) (3) (3) (3)

$81 = 3^4$

48

4   12

(2) (2)   (2) 6

(2) (3)
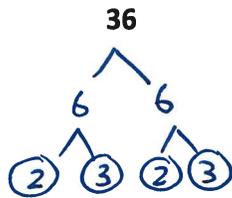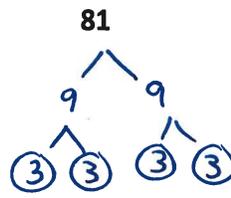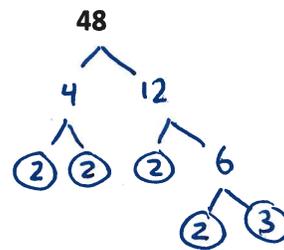
$48 = 2^4 \times 3$

Part 7 – Combination Questions

Q7: In the equation $5x^2 + 2 = 50$, what is the value of x?

*(Record your **three digit** answer in the Numerical Response boxes below)*

3	.	1	0

$$5x^2 + 2 = 50$$
$$ -2 \quad -2$$
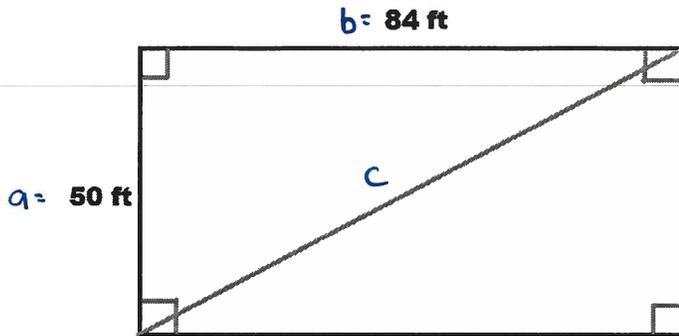$$5x^2 = 48$$
$$\div 5 \quad\quad \div 5$$
$$x^2 = 9.6$$
$$\sqrt{x^2} = \sqrt{9.6}$$
$$x = 3.09838...$$
$$x \approx 3.10$$

BEDMAS

■ KEY ■

Q8: Using Pythagoras Theorem, $a^2 + b^2 = c^2$, how long is the diagonal of the rectangle, in feet?

b= **84 ft**

a= **50 ft**

c

$$a^2 + b^2 = c^2$$
$$50^2 + 84^2 = c^2$$
$$2500 + 7056 = c^2$$
$$9556 = c^2$$
$$c \approx 97.754\ldots$$
$$c \approx 97.8 \text{ ft}$$

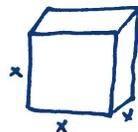*(Record your **three digit** answer in the Numerical Response boxes below)*

9	7	.	8

Q9: A cube has a volume of 729 cm³. What is the area of a single face of the cube?

*(Record your **three digit** answer in the Numerical Response boxes below)*

8	1	.	0

x

x   y

VOL = 729 cm³

VOL = L×W×H
VOL = (x)(x)(x)
$$x^3 = 729$$
$$\sqrt[3]{x^3} = \sqrt[3]{729}$$
$$x = 9$$

9

9
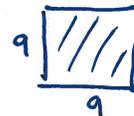
AREA = L×W
= (9)(9)
= 81

AREA ≈ 81.0

Math 10C   ■ KEY ■

Use the following information to answer Q10:

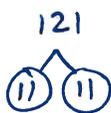**Venn Diagram for Perfect Squares and Perfect Cubes**

Descriptions
1 – Perfect Square only
2 – Both
3 – Perfect Cube only
4 - Neither

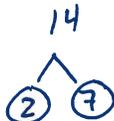**Q10:** Use prime factorization to determine if the following numbers are Perfect Squares, Perfect Cubes, both, or neither.

Region:	1	4	2	3
Number:	121	14	64	27

*(Record your **four digit** answer in the Numerical Response boxes below)*

| 1 | 4 | 2 | 3 |

121
⑪ ⑪

$121 = 11^2$
Perfect
Square

14
② ⑦

$14 = 2 \times 7$
Neither

64
8　8
② 4　② 4
②② ②②
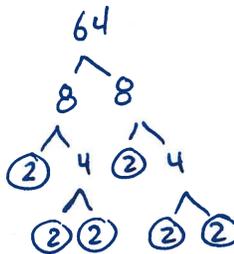
$64 = 2^6$
Both
$(2^3)(2^3)$
$(2^2)(2^2)(2^2)$

27
③　9
　　③ ③

$27 = 3^3$
Perfect Cube

Math 10C
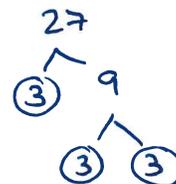
Part 8 – Exponent Laws Review

Rule #	Name	Rule	Example
1	Zero Exponent	$a^0 = 1, a \neq 0$	$5^0 = 1$
2	Product Rule	$(a^m)(a^n) = a^{m+n}$	$(5^3)(5^8) = 5^{11}$
3	Quotient Rule	$\dfrac{a^m}{a^n} = a^{m-n}$	$\dfrac{x^{10}}{x^4} = x^6$
4	Power Rule	$(a^m)^n = a^{mn}$	$(y^2)^3 = y^6$
5	Product to a Power	$(ab)^n = a^n b^n$	$(5x)^2 = 5^2 x^2 = 25x^2$
6	Quotient to a Power	$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$	$\left(\dfrac{x}{3}\right)^4 = \dfrac{x^4}{3^4} = \dfrac{x^4}{81}$

For all questions, simplify. Leave in exponential form.

Q1: $(3xy)^4 = 3^4 x^4 y^4$
$= 81 x^4 y^4$

Q2: $(2^3)^5 = 2^{15} = 32,768$

Q3: $\dfrac{x^8}{x^5} = x^3$

Q4: $\left(\dfrac{x}{y^8}\right)^0 = 1$

Q5: $\left(\dfrac{x}{5}\right)^3 = \dfrac{x^3}{5^3} = \dfrac{x^3}{125}$

Q6: $(5x^2)(3x^5) = (5)(3)(x^7) = 15x^7$

Q7: $(2x^3 * x^5)^6 = (2x^8)^6 = 2^6 (x^8)^6$
$= 64 x^{48}$

Q8: $\dfrac{(x^4 * x^3)}{(x^2)^3} = \dfrac{x^7}{x^6} = x^1 = x$