Squares and Square Roots

Exercise 2:

Solution 1:

1. $(9.5)^2 = 9.5 \times 9.5 = 90.25$
2. $(1.12)^2 = 1.12 \times 1.12 = 1.2544$
3. $(0.09)^2 = 0.09 \times 0.09 = 0.0081$
4. $(-0.01)^2 = (-0.01) \times (-0.01) = 0.0001$
5. $(0.7)^2 = (0.7) \times (0.7) = 0.49$
6. $(-2.16)^2 = (-2.16) \times (-2.16) = 4.6656$
7. $(-5.13)^2 = (-5.13) \times (-5.13) = 26.3169$
8. $(7.7)^2 = 7.7 \times 7.7 = 59.29$
9. $(-0.002)^2 = (-0.002) \times (-0.002) = 0.000004$
10. $(-9.1)^2 = (-9.1) \times (-9.1) = 82.81$
11. $(1.23)^2 = (1.23) \times (1.23) = 1.5129$
12. $(-0.45)^2 = (-0.45) \times (-0.45) = 0.2025$

Solution 2:

Given, $85^2 = 7225$

1. $8.5^2 = 72.25$
2. $0.85^2 = 0.7225$
3. $0.085^2 = 0.007225$

Solution 3:

Given, $6.4^2 = 40.96$

1. $64^2 = 4096$
2. $(0.064)^2 = 0.004096$
3. $0.64^2 = 0.4096$

Exercise 3:

Solution 1(1):

$$\sqrt{\frac{400}{49}} = \sqrt{\frac{20 \times 20}{7 \times 7}} = \frac{20}{7}$$

Solution 1(2):

$$\sqrt{\frac{100}{121}} = \sqrt{\frac{10 \times 10}{11 \times 11}} = \frac{10}{11}$$

Solution 1(3):

$$\sqrt{\frac{225}{64}} = \sqrt{\frac{15 \times 15}{8 \times 8}} = \frac{15}{8}$$

Solution 1(4):

$$2\frac{1}{4} = \frac{2 \times 4 + 1}{4} = \frac{9}{4}$$

$$\sqrt{\frac{9}{4}} = \sqrt{\frac{3 \times 3}{2 \times 2}} = \frac{3}{2}$$

Solution 1(5):

$$2\frac{7}{9} = \frac{2 \times 9 + 7}{9} = \frac{25}{9}$$

$$\sqrt{\frac{25}{9}} = \sqrt{\frac{5 \times 5}{3 \times 3}} = \frac{5}{3}$$

Solution 1(6):

$$\sqrt{\frac{196}{81}} = \sqrt{\frac{14 \times 14}{9 \times 9}} = \frac{14}{9}$$

Solution 1(7):

$$\sqrt{\frac{441}{256}} = \sqrt{\frac{21 \times 21}{16 \times 16}} = \frac{21}{16}$$

Solution 1(8):

First find the factors of 2

$$2025 = 5 \times 405$$
$$= 5 \times 5 \times 81$$
$$= 5 \times 5 \times 9 \times 9$$
$$= 45 \times 45$$
$$\sqrt{2025} = \sqrt{45 \times 45} = 45$$

Solution 1(9):

First find the factors of 63504.

$$63504 = 4 \times 15876$$
$$= 4 \times 4 \times 3969$$
$$= 4 \times 4 \times 9 \times 441$$
$$= 4 \times 4 \times 9 \times 9 \times 49$$
$$= 4 \times 4 \times 9 \times 9 \times 7 \times 7$$
$$= (4 \times 9 \times 7)^2$$
$$= (252)^2$$
$$\sqrt{63504} = \sqrt{(252)^2} = 252$$

Solution 1(10):

First find the factors of 1936:

$$1936 = 4 \times 484$$
$$= 4 \times 4 \times 121$$
$$= 4 \times 4 \times 11 \times 11$$
$$= (4 \times 11)^2$$

Also find the factors of 40401:

$$40401 = 3 \times 3 \times 4489$$
$$= 3 \times 3 \times 67 \times 67$$
$$= (3 \times 67)^2$$
$$\sqrt{\frac{1936}{40401}} = \sqrt{\frac{(4 \times 11)^2}{(3 \times 67)^2}} = \frac{4 \times 11}{3 \times 67} = \frac{44}{201}$$

Exercise 4:

Solution 1:

1. $784 = \overline{7}\,\overline{84}$
2. $1764 = \overline{17}\,\overline{64}$
3. $9409 = \overline{94}\,\overline{09}$
4. $961 = \overline{9}\,\overline{61}$
5. $9801 = \overline{98}\,\overline{01}$
6. $50625 = \overline{5}\,\overline{06}\,\overline{25}$
7. $99225 = \overline{9}\,\overline{92}\,\overline{25}$
8. $53361 = \overline{5}\,\overline{33}\,\overline{61}$
9. $18225 = \overline{1}\,\overline{82}\,\overline{25}$

Solution 2(1):

		4 7
	4	$\overline{22}\overline{09}$
+	4	− 16
	87	609
+	7	− 609
	94	000

$\sqrt{2209} = 47$

Solution 2(2):

		6 1
	6	$\overline{37}\overline{21}$
+	6	− 36
	121	121
+	1	− 121
	122	000

$\sqrt{3721} = 61$

Solution 2(3):

			8 3
	8		$\overline{68}\,\overline{89}$
+	8	−	64
	163		489
+	3	−	489
	166		000

$\sqrt{6889} = 83$

Solution 2(4):

			8 9
	8		$\overline{79}\,\overline{21}$
+	8	−	64
	169		1521
+	9	−	1521
	178		0000

$\sqrt{7921} = 89$

Solution 2(5):

			1 0 7
	1		$\overline{11}\,\overline{44}\,\overline{49}$
+	1	−	1
	20		014
+	0	−	00
	207		1449
+	7	−	1449
	214		0000

$\sqrt{11449} = 107$

Solution 2(6):

	1		1 3 1
			$\overline{1}\,\overline{7}\,\overline{1}\overline{6}\overline{1}$
+	1	−	1
	23		071
+	3	−	69
	261		261
+	1	−	261
	262		000

$\sqrt{17161} = 131$

Solution 2(7):

	1		1 3 9
			$\overline{1}\,\overline{9}\,\overline{3}\overline{2}\overline{1}$
+	1	−	1
	23		093
+	3	−	69
	269		2421
+	9	−	2421
	278		000

$\sqrt{19321} = 139$

Solution 2(8):

	1		1 5 7
			$\overline{2}\,\overline{4}\,\overline{6}\overline{4}\overline{9}$
+	1	−	1
	25		146
+	5	−	125
	307		2149
+	7	−	2149
	314		0000

$\sqrt{24649} = 157$

Solution 2(9):

		1 9 9
	1	$\overline{39601}$
+	1	− 1
	29	296
+	9	− 261
	389	3501
+	9	− 3501
	398	0000

$\sqrt{39601} = 199$

Solution 2(10):

		1 1 5
	1	$\overline{13225}$
+	1	− 1
	21	032
+	1	− 21
	225	1125
+	5	− 1125
	230	0000

$\sqrt{13225} = 115$

Solution 2(11):

		2 5 2
	2	$\overline{63504}$
+	2	− 4
	45	235
+	5	− 225
	502	1004
+	2	− 1004
	504	0000

$\sqrt{63504} = 252$

Solution 2(12):

			2 4 5
	2		$\overline{60025}$
+	2	−	4
	44		200
+	4	−	176
	485		2425
+	5	−	2425
	490		0000

$\sqrt{60025} = 245$

Solution 2(13):

			2 7 1
	2		$\overline{73441}$
+	2	−	4
	47		334
+	7	−	329
	541		541
+	1	−	541
	542		0000

$\sqrt{73441} = 271$

Solution 2(14):

			2 3 4
	2		$\overline{54756}$
+	2	−	4
	43		147
+	3	−	129
	464		1856
+	4	−	1856
	468		0000

$\sqrt{54756} = 234$

Solution 2(15):

		1 2 5
	2	$\overline{15625}$
+	2	− 1
	22	056
+	2	− 44
	245	1225
+	5	− 1225
	250	0000

$\sqrt{15625} = 125$