1

8.1

Ex 1 $\longrightarrow$ $c^2 = 9$

c = square root of 9

2 square roots, positive ($\sqrt{9}$)

and negative ($-\sqrt{9}$)

11., 13., 15.

17.

Ex 2 $\longrightarrow$ 19, 26., 27

Ex 3 $\longrightarrow$ 31

Ex 4 $\longrightarrow$ 37, 39

Ex 5 $\longrightarrow$ wait.

6 $\rightarrow$ 61, 63, 65.

7 $\rightarrow$ 55, 53.

2

8.1 $c^2 = a$ $\sqrt{a}$

	NUMBER = a	c = SQUARE ROOTS	POSITIVE SQUARE ROOT
11	100	10, −10	$\sqrt{100} = 10$
13.	36	6, −6	$\sqrt{36} = 6$
	81	9, −9	$\sqrt{81} = 9$
	25	5, −5	$\sqrt{25} = 5$
15.	1	1, −1	$\sqrt{1} = 1$
17.	144	12, −12	$\sqrt{144} = 12$

19. $\sqrt{100} = 10$; reason: $10^2 = (10)^2 = 100$

26. $\sqrt{400} = 20$; $20^2 = (20)^2 = 400$

27. $\sqrt{900} = 30$; $30^2 = (30)^2 = 900$

(3)

29. $-\sqrt{144} = (-1)\cdot\sqrt{144}$
$= (-1)\cdot 12 = -12$

read: The negative square root of $144 = -12$.
Reason: $(-12)^2 = 144$.

just like -2 = the negative of 2.

---

counter example defying math laws: $\sqrt{-144}$ is undefined.

Reason: there is no c such that $c^2 = -144$.

(4

8.1

(31.) $\sqrt{10a}$ ← RADICAL

10a ← RADICAND = 10a

Rational OR IRRational*

Decimal that ends or repeats

$\pi = 3.14\ldots$ never ends or repeats

(37.) $\sqrt{4} = 2$
rational

$\sqrt{2} = 1.41\ldots$

$2 = 2.0$
$= 2.00$
$= 2.0000\ldots$

(39.) $\sqrt{11}$ irrational

PARTIAL REASON: radicand is
not a perfect SQUARE.

* includes transcendental numbers.

61. $\sqrt{x^2}$

<u>Nice assumption:</u>

Easy $x \geq 0$. (x is non-negative)

$\sqrt{x^2} = x$; $\sqrt{(x)^2} = x$ ← preferred

Definition: IF $a \geq 0$

$\sqrt{a^2} = a$; $\sqrt{(a)^2} = a$ ← preferred

<u>NOTE!</u> 55. $\sqrt{(10x)^2} = |10x|$

x any real. Easy $= 10x$, $x \geq 0$.

63. <u>Assume:</u> $y \geq 0$.

$\sqrt{(5y)^2} = 5y$

Easy

65. $\sqrt{16t^2}$; $t \geq 0$

$\sqrt{4^2 t^2} = \sqrt{(4t)^2}$

65.

$$\sqrt{16t^2} = \sqrt{4^2t^2}$$

$$= \sqrt{(4t)^2}$$

$$= 4t$$; no comment

$$\sqrt{5^2x^2}$$

66. $$\sqrt{25x^2} = 5x$$

$$\sqrt{(5x)^2}$$

8.2

EX 1 → 17, 11, 25

EX 2 → $\sqrt{18}$ ⇒ 29, 31.

→ $\sqrt{9 \cdot 2} = \sqrt{9} \cdot \sqrt{2} = 3 \cdot \sqrt{2}$

3 → come back

4 → 53, 55

classical

5 → 57, 59

6 → 67, 85.

---

17. $\sqrt{10} \cdot \sqrt{10} = \sqrt{10 \cdot 10} = \sqrt{10^2} = 10$

PAGE 491 $\sqrt{A} \cdot \sqrt{B} = \sqrt{A \cdot B}$

11. $\sqrt{2} \cdot \sqrt{5} = \sqrt{2 \cdot 5} = \sqrt{10}$ = irrational.

circle (b.) → Follow up: circle one (a) rational or (b) irrational.

8

27. $\sqrt{3X} \cdot \sqrt{7Y} = \sqrt{3X \cdot 7Y}$

$= \sqrt{21XY}$

Theme: FIND perfect squares under $\sqrt{\ }$.
USE FACTORING

29. $\sqrt{12} = \sqrt{4 \cdot 3}$

$\sqrt{A \cdot B} = \sqrt{A} \cdot \sqrt{B}$

$= \sqrt{4} \cdot \sqrt{3}$

$2 \cdot \sqrt{3}$

$= 2\sqrt{3}$

NOTE: $\sqrt{a} = \sqrt[2]{a}$ LATER SECTION.

31. $\sqrt{75} = \sqrt{25 \cdot 3} = \sqrt{25} \cdot \sqrt{3}$

$= 5 \cdot \sqrt{3}$

$= 5\sqrt{3}$

8.2

$a \geq 0$.

53. $\sqrt{a^{18}} = \sqrt{(a^9)^2}$

$= a^9$

* $\sqrt{(\text{anything})^2} = \text{anything}$

shortcut

$\sqrt{a^{18}} = a^{18/2} = a^9$

55. $\sqrt{x^{16}} = x^8 \longleftrightarrow \sqrt{x^{16}} = x^{16/2}$

$= x^8$.

$\sqrt{x^{16}} = \sqrt{(x^8)^2} = x^8$

* $\sqrt{(a)^2} = a$

57.) $\sqrt{r^5} = \sqrt{(r^2)^2 \cdot r^1}$

$$2\overset{2}{\overline{)5}}$$
$$\underline{-4}$$
$$1$$

$= \sqrt{(r^2)^2} \cdot \sqrt{r^1}$

$\sqrt{A \cdot B} = \sqrt{A} \cdot \sqrt{B}$

$\sqrt{(r^2)^2} \cdot \sqrt{r^1}$

NOTE: $r^1 = r$

$\downarrow$

$r^2 \cdot \sqrt{r}$

$= r^2 \cdot \sqrt{r}$

$\sqrt{(a)^2} = a$

$\updownarrow$

$\sqrt{(r^2)^2} = r^2$

Test 4 Example:

$\sqrt{x^7} = \sqrt{(x^3)^2 \cdot x^1} = \sqrt{(x^3)^2} \cdot \sqrt{x^1}$

$$2\overset{3}{\overline{)7}}$$
$$\underline{6}$$
$$1$$

$= x^3 \cdot \sqrt{x} = x^3\sqrt{x}$

11

Make up test 9

sec. 8.2

$$\sqrt{x^{99}} = \sqrt{x^{98} \cdot x^1}$$

$$= \sqrt{(x^{49})^2 \cdot x^1}$$

$$= x^{49} \cdot \sqrt{x}$$

59. $\sqrt{t^{15}} = \sqrt{t^{14} \cdot t^1}$

$\left[\sqrt{A \cdot B} = \sqrt{A} \cdot \sqrt{B}\right]$

$$= \sqrt{t^{14}} \cdot \sqrt{t^1} = \sqrt{(t^7)^2} \cdot \sqrt{t^1}$$

$$= t^7 \cdot \sqrt{t}$$

(12

8.2

67. $\sqrt{2}\cdot\sqrt{10}$

use $\sqrt{A}\cdot\sqrt{B}=\sqrt{A\cdot B}$

$\sqrt{2}\cdot\sqrt{10}=\sqrt{2\cdot 10}$

$=\sqrt{20}$

$=\sqrt{4\cdot 5}$

$=\sqrt{4}\cdot\sqrt{5}$

$=2\cdot\sqrt{5}$

$=2\sqrt{5}$

$\sqrt{4}=2$ because $2^2=4$

85.

$$\sqrt{x^2 y^3} \cdot \sqrt{x y^4}$$

random cut

$$\sqrt{x^2 \cdot y^2 \cdot y} \cdot \sqrt{x \cdot (y^2)^2}$$

$$= xy \cdot \sqrt{y} \cdot y^2 \cdot \sqrt{x}$$

$$= xy^3 \cdot \sqrt{xy}$$

systematic (SAFE) METHOD

$$= \sqrt{x^2 \cdot y^3 \cdot x y^4}$$

$$= \sqrt{x^3 \cdot y^7}$$

$$= \sqrt{(x^1)^2 \cdot x^1 \cdot (y^3)^2 \cdot y^1}$$

$$= x^1 \cdot y^3 \cdot \sqrt{x^1 \cdot y^1} = xy^3 \cdot \sqrt{xy}$$