

# Answer Key

1.  $x \cdot x^3 \cdot x^5 \cdot x^7 = x^{16}$
2.  $-(-a^2)^2(a^3)^3 = -a^4a^9 = -a^{13}$
3.  $(x^2)^2(x^3)^3 = x^{13}$
4.  $3(-2xy^2z^3)^3 = -24x^3y^6z^9$
5.  $3t^6$
6.  $\frac{3}{-10x^3}$
7.  $\frac{3x}{2y^4}$
8.  $-\frac{1}{2xy^2}$
9.  $\frac{15}{2x}$
10.  $\frac{5t^3}{3s^2}$
11.  $\frac{10b}{3}$
12.  $s^{14}$
13.  $t^2$
14.  $\frac{1}{w^8}$
15.  $\frac{9x^6}{y^8} \frac{x^{21}}{6^3y^{15}} = \frac{x^{27}}{24y^{23}}$
16.  $\frac{1}{a^5}$
17.  $\left(\frac{y}{2x}\right)^7 = \frac{y^7}{2^7x^7}$
18.  $\frac{1}{c^9}$
19. 1
20.  $576 x^6y^{12}z^{18}$
21.  $\left(\frac{y}{2x}\right)^{-7} = \left(\frac{2x}{y}\right)^7$
22.  $\left(\frac{c^{-6}}{c^{15}}\right)^{-1} = \left(\frac{1}{c^{21}}\right)^{-1} = c^{21}$
23.  $-2x^{-2} = \frac{-2}{x^2}$
24.  $6t^4/(3t^{-3}) = 2t^{4-(-3)} = 2t^7$
25.  $(-4p^4)(3p^{-3})/(3p^{-2}4p^5) = \frac{-12p^{-7}}{12p^3} = \frac{-1}{p^{10}}$
26.  $2\sqrt{11}$
27.  $8\sqrt{2}$
28.  $12\sqrt{2}$
29.  $18\sqrt{2}$
30.  $18\sqrt{3}$
31. 30
32.  $\frac{y}{2x^2} \sqrt{\frac{y}{3x}}$
33.  $10s^2t^2\sqrt{(15st)}$
34.  $\frac{6}{7xy^3} \sqrt{\frac{2}{x}}$
35.  $(30\sqrt{15})x^2y$
36. 8000
37. 8
38. 64
39. 10
40. 100
41. 40
42. 64000
43. 50
44. 125000
45. 20
46.  $Y = 6/7X - 3$
47.  $Y = 4/7X - 13/7$
48.  $Y = 1/3X + 8/3$
49.  $-X - 6Y = 20$
50.  $5X + 6Y = 9$
51. 20
52. 84.5
53. 136
54. 62.5
55.  $1.5\sqrt{13}$
56.  $x^2 + 6x + 9$
57.  $x^2 - 6x + 9$
58.  $4x^2 - 4x + 1$
59.  $9x^2 - 6x + 1$
60.  $25x^2 + 2x + 0.04$
61.  $(x + 1)^2$
62.  $(x + 2)^2$
63.  $(x - 3)^2$
64.  $(x - 9)^2$
65.  $(x + 4)^2$
66. 16, 8, 17
67. 25, -10, 15
68. 4, -20, -10
69. 2, 16, 19
70. 25, -20, 28
71. 1, 3, 4, -3
72. 2, 1, 6, -62

## MAP 285 (T2) Issue 7

73. 2, 3, -5, -74

74. 2, 3, 5, -30

75. 2, 4, -5, -33

76. 72

77.  $250000 + 12000 + 144 = 262144$

78.  $4\sqrt{xy} = 12$

79.  $4^{x+2} + 4^{x+5} = 65(4^{x+2}) = 130$

$$4^{x+2} = 2$$

$$x + 2 = 0.5$$

$$x = -1.5$$

80. 2

81. 385

82. C

83. 9

84.  $(x + \frac{1}{x})^2 = x^2 + 2 + \frac{1}{x^2} = 9$

$$x + \frac{1}{x} = \sqrt{7}$$

$$x^2 - 1 + \frac{1}{x^2} = 6$$

$$x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)\left(x^2 - 1 + \frac{1}{x^2}\right) = 6\sqrt{7}$$

85. Method I)

$$\text{Let } a = 2019$$

$$2021 = a + 2$$

$$(a + 2)^3 = a^3 + 6a^2 + 12a + 8$$

$$2021^3 - a^3 = 6a^2 + 12a + 8$$

$$(6a^2 + 12a + 8 - 2) \div 6 = a^2 + 2a + 1 = (a + 1)^2$$

$$\sqrt{\frac{x-2}{6}} = a + 1 = 2020$$

Method II)

$$\text{Let } a = 2021$$

$$b = 2019$$

$$x = a^3 - b^3 = (a-b)(a^2 + ab + b^2) = (a-b)^3 +$$

$$3ab(a-b)$$

$$a - b = 2$$

$$x - 2 = 8 + 3ab(2) - 2 = 6ab + 6 = 6(ab + 1)$$

$$\frac{x-2}{6} = ab + 1$$

$$a = 2020 + 1$$

$$b = 2020 - 1$$

$$ab + 1 = 2020^2 - 1 + 1 = 2020^2$$

$$\sqrt{\frac{x-2}{6}} = 2020$$

# Answer Key

1.  $2^4 \times 3^6$
2.  $2^7 \times 5^3$
3.  $2^9$
4. 3
5.  $2^{24}$
6.  $5^1 \times 2^3 \times 5^2 \times 2^4 = 2^7 \times 5^3$
7.  $9^2 = 3^4$
8.  $8^2 = 2^6$
9. -81
10. 81
11. 981
12.  $(2.3 \times 0.5) \times 4 = 2.3 \times (0.5 \times 4) = 2.3 \times 2 = 4.6$
13.  $x^{4+5-3} = x^6$
14.  $x^{5+10-(4+2)} = x^{15-6} = x^9$
15.  $-8t^5$
16.  $-81t^{12} = 81t^{6 \cdot 2} = 81t^{12}$
17.  $1/x^7$
18.  $1/x^9$
19.  $5/x^4$
20.  $(3)(4)^2(2)^3$   
 $= (3)(16)(8)$   
 $= 384$
21.  $4^6 \div 2^3 = 2^{12} \div 2^3 = 2^9$
22.  $8^3 \cdot 5/3$
23.  $2^6$
24.  $16^2 \times 2^3 = (2^4)^2 \times 2^3 = 2^8 \times 2^3 = 2^{11}$
25.  $8^4$
26.  $4^4 = (2^2)^4 = 2^8$
27.  $4^3 = 2^6 \cdot 2$
28.  $4^2 \times 2^3 = 2^4 \times 2^3 = 2^7$
29.  $4^6$
30.  $16^3$
31.  $8^3 \cdot 5$
32.  $3^3$
33.  $27^6$
34.  $27^3$
35.  $3^6 \div 9^2 = 3^6 \div 3^4 = 3^2$
36.  $25^3 = (5^2)^3 = 5^6$
37.  $25^2 \times 5^4 = 5^4 \times 5^4 = 5^8$
38.  $25^3$
39.  $5^7$
40.  $125^6$
41.  $(-2)^2 = 4$
42.  $-2(-x^5)^3 = -2(-x^{15}) = 2x^{15}$
43.  $(x^{-1})^2 = (\frac{1}{x})^2 = \frac{1}{x^2}$
44.  $\frac{x^4}{x^6} = \frac{1}{x^2}$
45.  $3^3$
46.  $\frac{8}{125}$
47.  $\frac{1}{32}$
48.  $\frac{1}{16x^4}$
49.  $\frac{1}{16x^4}$
50.  $\frac{-1}{32x^5}$
51.  $-32x^5$
52. -1
53. 1
54.  $1/64$
55.  $\frac{1}{(-2x)^3} = \frac{1}{-8x^3}$
56. 1
57.  $\frac{4}{9}$
58.  $\frac{-1}{t^6}$
59.  $\frac{1}{(-2x)^4} = \frac{1}{16x^4}$
60.  $n = 2$
61. Using longhand multiplication, we have the following:
 

A	-	B
× A	+	B
AB	-	B <sup>2</sup>
A <sup>2</sup>	-	AB
A <sup>2</sup>	-	B <sup>2</sup>
62. Try something different than longhand multiplication. Be fancy! Think of  $98 = 100 - 2$ , what then  $102 = ?$  Be smart:  $102 = 100 + 2$ . That means we assume  $A = 100$ ,  $B = 2$ .  
 Now,  $98 \times 102 = (100 - 2)(100 + 2)$   
 $= 100^2 - 2^2$   
 $= 10,000 - 4$   
 $= 9,996$
63.  $(x + 3)(x - 3) = x^2 - 9$

## MAP 285 (T2) Issue 8

64.  $(2x + 5)(2x - 5) = 4x^2 - 25$
65.  $97 \times 103 = 10,000 - 9 = 9,991$
66.  $197 \times 203 = 40,000 - 9 = 39,991$
67.  $306 \times 294 = 90,000 - 36 = 89,964$
68.  $208 \times 192 = 40,000 - 64 = 39,936$
69.  $1234567890 = 1234567891 - 1$   
 $1234567892 = 1234567891 + 1$   
Let  $a = 1234567891$ .  
 $a^2 - (a - 1)(a + 1)$   
 $= a^2 - (a^2 - 1)$   
 $= \boxed{1}$
70.  $9x^2 - 18x + 9$
71.  $4x^2 - 8x + 4$
72.  $25x^2 - 70x + 49$
73.  $x^2 - 2x + 1$
74.  $36x^2 - 60x + 25$
75.  $25x^2 - 20x + 4$
76.  $144x^2 - 120x + 25$
77.  $x^2 + 5x - 24$
78.  $x^2 + 3x - 54$
79.  $x^2 - 6x - 7$
80.  $4n^2 + 27n + 18$
81.  $x^2 - 1$
82.  $4x^2 - 81$
83.  $50x^2 - 18$
84.  $\frac{1}{4}x^2 - 9$
85.  $\frac{1}{3}x^2 - 3$
86.  $x^2 - 25$
87.  $x^2 - 100$
88.  $x^2 - 121$
89.  $x^2 - 4y^2$
90.  $x^2 - 36y^2$
91.  $9x^2 - y^2$
92.  $49x^2 - 64y^2$
93.  $36a^2 - 25b^2$
94.  $x^2 - 1$
95.  $x^2 - 4$
96.  $x^2 - 9$
97.  $2x^2 - 32$
98.  $x^4 - 1$
99.  $x^4 - 16$
100.  $x^4 - y^4$

# Answer Key

1.  $\frac{1}{37}$
2.  $\frac{1}{3^3}$
3.  $\frac{9}{4}$
4.  $x$
5.  $\frac{-1}{3x}$
6. 0
7.  $\frac{-27x}{4x^2}$
8.  $(-4p)^2 \cdot (3p^6) = 48p^8$
9.  $x^2x^5y^2y^3 = x^7y^5$
10.  $\frac{1}{x^3}$
11.  $\frac{3y^3}{x^3}$
12.  $2x^3y$
13.  $\frac{3y}{2x^{11}}$
14.  $\frac{-8x^8}{3y^8}$
15.  $(2x^4y)^{-1}(2x^2y^2)(5xy) = \frac{1}{2x^4y} \cdot 10x^3y^3 = \frac{5y^2}{x}$
16.  $10^2 = 100$
17.  $51^2 = 2601$
18.  $(2\frac{2}{3} \times 3\frac{3}{4} \times 5\frac{1}{10})^2 = 51^2 = 2601$
19. Incorrect. It should be  $(2\frac{2}{3})^2 = (\frac{8}{3})^2 = \frac{64}{9}$
20.  $= x^2yz^5 + 3x^2yz^5 + 2xy^2z^5 - 7xy^2z^5$   
 $= 4x^2yz^5 - 5xy^2z^5$
21. 216
22. -108
23. 37
24.  $3^{14}$
25.  $(\frac{1}{3^3})^{-2} = 3^6$
26.  $-x^6$
27.  $-27y^3$
28.  $16t^8$
29.  $p^{-6}p^6 = p^0 = 1$
30.  $x^{-1} \cdot x^2 \cdot x^{-3} \cdot x^4 \cdot x^{-5} = 1/x^3$
31.  $1/x^{14}$
32.  $15a^2x^4$
33.  $-x^{14}y^{21}$
34.  $\frac{24y^8}{x^5}$
35.  $-189a^{10}b^4c^4$
36.  $\frac{y^4}{x^2}$
37.  $\frac{x^3}{3}$
38.  $\frac{-5y^6}{24x^8}$
39.  $\frac{9y^4}{4x^7}$
40.  $\frac{-4y^3}{x^3}$
41.  $x^7$
42.  $-120x^{15}$
43.  $x^{15}$
44.  $x^7$
45.  $32w^{10}$
46.  $-x^{17}$
47.  $s^{24}$
48.  $120s^9$
49.  $-c^6$
50.  $30a^{-6}b^3 = \frac{30b^3}{a^6}$
51.  $\frac{10s^2}{t^3}$
52.  $-30xy^3$
53.  $9x^6y^8$
54.  $25a^4b^6$
55.  $-8a^5x^4$
56.  $-20x^7y^4$
57.  $\frac{-p^{10}}{p^8} = -p^2$
58.  $\frac{25a^4b^6}{-1000a^{12}b^6} = \frac{1}{-40a^8}$
59.  $\frac{63a^6b^3c^4}{-3a^4b} = -21a^2b^2c^4$
60.  $\frac{t^2 \cdot 3t^4}{4t^3} = \frac{3t^6}{4t^3} = \frac{3t^3}{4}$
61.  $(6x + 3)^2$
62.  $(4x + 5)^2$
63.  $(3x + 2)^2$
64.  $(7x + 5)^2$
65.  $(7x - 0.3)^2$
66.  $(9x + 4)^2$
67.  $(x + 4)^2$
68.  $(9x - 2)^2$
69.  $(4x - 2)^2$
70.  $(3x + 5)^2$

## MAP 285 (T2) Issue 9

71.  $(x - 5)^2$

72.  $(6x - 1)^2$

73.  $(5x + 1)^2$

74.  $(7x - 2)^2$

75.  $(7x + 0.6)^2$

76.  $(6x + 1)^2$

77.  $(6x + 2)^2$

78.  $(7x + 5)^2$

79.  $(8x + 5)^2$

80.  $(x + 5)^2$