32E

1) 2.38×10^7

2) 1.12×10^{-7}

3) $\approx 600{,}000$ or 6×10^5
$(9.2 \times 10^{-1})(6.4 \times 10^5)$

4) $(9.2 \times 6.4)(10^{-1} \times 10^5) = 58.88 \times 10^4$

5) 5.888×10^5 with significant digits 5.9×10^5

6) check with calculator

7) ≈ 100 or 1×10^2
$(4 \times 10^{-1})(2.5 \times 10^{-1}) \div (1 \times 10^{-3})$

8) $(4 \times 2.5 \div 1)(10^{-1} \times 10^{-1} \div 10^{-3}) = 10 \times 10^1$

9) 1×10^2 (significant digits correct)

10) check with calculator

11) $A^{9/12} \cdot A^{16/12} = A^{25/12}$

12) $3^1 \cdot 3^2 \cdot 3^4 = 3^7$

13) $\frac{100 \text{ m}}{1} \times \frac{1.1 \text{ yds.}}{1 \text{ m}} = 110 \text{ yds.}$

14) $\frac{2 \text{ ℓ}}{1} \times \frac{1.06 \text{ qts.}}{1 \text{ ℓ}} = 2.12 \text{ qts.}$

15) $(X - B)(X + B)$

16) $4X(X^4 - 81)$
$4X(X^2 - 9)(X^2 + 9)$
$4X(X - 3)(X + 3)(X^2 + 9)$

17) $X^2 + X - 72 = 0$
$(X + 9)(X - 8) = 0$
$X = -9,\ X = 8$

$(-9)^2 + (-9) - 12 = 60$
$81 - 9 - 12 = 60$
$60 = 60$

$(8)^2 + (8) - 12 = 60$
$64 + 8 - 12 = 60$
$60 = 60$

18) $(2 - A)(2 + A) = 0$
$A = 2,\ A = -2$

$4 - (-2)^2 = 0$
$4 - 4 = 0$
$4 - (2)^2 = 0$
$4 - 4 = 0$

19) $\frac{9.5 \times 10^6 \text{ mi}^2}{1} \times \frac{5.28 \times 10^3 \text{ ft.}}{1 \text{ mi.}} \times \frac{5.28 \times 10^3 \text{ ft.}}{1 \text{ mi.}}$

$= 265 \times 10^{12} = 2.65 \times 10^{14}$ sq. ft.

with significant digits 2.6×10^{14} sq. ft. or 2.7×10^{14} sq. ft. depending on when rounding was done.

20) $(2.65 \times 10^{14} \text{ sq. ft.}) \div (6 \times 10^9 \text{ people}) =$
$(2.65 \div 6)(10^{14} \div 10^9) = .44 \times 10^5 =$
4.4×10^4 sq. ft. per person

1 acre $\approx 4.4 \times 10^4$ sq. ft. so 1 acre per person

33A

1) $3^3 = 27$

$27\overline{)80}\ 2,\ 54,\ 26$ $\quad 9\overline{)26}\ 2,\ 18,\ 8$ $\quad 3\overline{)8}\ 2,\ 6,\ 2$ $\quad 1\overline{)2}\ 2,\ 2,\ 0$

2222_3

2) $5^2 = 25$

$25\overline{)80}\ 3,\ 75,\ 5$ $\quad 5\overline{)5}\ 1,\ 5,\ 0$ $\quad 1\overline{)0}\ 0,\ 0,\ 0$

310_5

3) $4^3 = 64$

$64\overline{)80}\ 1,\ 64,\ 16$ $\quad 16\overline{)16}\ 1,\ 16,\ 0$ $\quad 4\overline{)0}\ 0,\ 0,\ 0$ $\quad 1\overline{)0}\ 0,\ 0,\ 0$

1100_4

4) $6^2 = 36$

$36\overline{)100}\ 2,\ 72,\ 28$ $\quad 6\overline{)28}\ 4,\ 24,\ 4$ $\quad 1\overline{)4}\ 4,\ 4,\ 0$

244_6

5) $8^3 = 512$

$512\overline{)1352}\ 2,\ 1024,\ 328$ $\quad 64\overline{)328}\ 5,\ 320,\ 8$ $\quad 8\overline{)8}\ 1,\ 8,\ 0$ $\quad 1\overline{)0}\ 0,\ 0,\ 0$

2510_8

6) $6^4 = 1296$

$1296\overline{)1352}\ 1,\ 1296,\ 56$ $\quad 216\overline{)56}\ 0,\ 0,\ 56$ $\quad 36\overline{)56}\ 1,\ 36,\ 20$ $\quad 6\overline{)20}\ 3,\ 18,\ 2$ $\quad 1\overline{)2}\ 2,\ 2,\ 0$

10132_6

7) $5 \times 7^2 + 6 \times 7^1 + 3 \times 7^0$
$5(49) + 6(7) + 3(1) =$
$245 + 42 + 3 = 290$

8) $4 \times 5^2 + 4 \times 5^1 + 1 \times 5^0$
$4(25) + 4(5) + 1(1) =$
$100 + 20 + 1 = 121$

9) $2 \times 3^3 + 1 \times 3^2 + 2 \times 3^1 + 1 \times 3^0$
$2(27) + 1(9) + 2(3) + 1(1) =$
$54 + 9 + 6 + 1 = 70$

10) $3 \times 5^3 + 4 \times 5^2 + 2 \times 5^1 + 1 \times 5^0$
$3(125) + 4(25) + 2(5) + 1(1) =$
$375 + 100 + 10 + 1 = 486$

11) $6 \times (12)^2 + 10 \times (12)^1 + 8 \times (12)^0$
$6(144) + 10(12) + 8(1) =$
$864 + 120 + 8 = 992$

12) $11 \times (13)^2 + 8 \times (13)^1 + 1 \times (13)^0$
$11(169) + 8(13) + 1(1) =$
$1859 + 104 + 1 = 1964$

Problem in Student Text was rewritten after first printing.
This is a solution for $E81_{13} =$ _____$_{10}$

1) $2^6 = 64$

$$64\overline{)95}\ 1,\ 64,\ 31 \qquad 32\overline{)31}\ 0,\ 31 \qquad 16\overline{)31}\ 1,\ 16,\ 15 \qquad 8\overline{)15}\ 1,\ 8,\ 7$$

$$4\overline{)7}\ 1,\ 4,\ 3 \qquad 2\overline{)3}\ 1,\ 2,\ 1 \qquad 1\overline{)1}\ 1,\ 1,\ 0$$

1011111_2

2) $5^2 = 25$

$$25\overline{)95}\ 3,\ 75,\ 20 \qquad 5\overline{)20}\ 4,\ 20,\ 0 \qquad 1\overline{)0}\ 0,\ 0,\ 0$$

340_5

3) $7^2 = 49$

$$49\overline{)95}\ 1,\ 49,\ 46 \qquad 7\overline{)46}\ 6,\ 42,\ 4 \qquad 1\overline{)4}\ 4,\ 4,\ 0$$

164_7

4) $8^2 = 64$

$$64\overline{)100}\ 1,\ 64,\ 36 \qquad 8\overline{)36}\ 4,\ 32,\ 4 \qquad 1\overline{)4}\ 4,\ 4,\ 0$$

144_8

5) $12^2 = 144$

$$144\overline{)1352}\ 9,\ 1296,\ 56 \qquad 12\overline{)56}\ 4,\ 48,\ 8 \qquad 1\overline{)8}\ 8,\ 8,\ 0$$

948_{12}

6) $9^3 = 729$

$$729\overline{)1352}\ 1,\ 729,\ 623 \qquad 81\overline{)623}\ 7,\ 567,\ 56 \qquad 9\overline{)56}\ 6,\ 54,\ 2 \qquad 1\overline{)2}\ 2,\ 2,\ 0$$

1762_9

7) $1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

$1(16) + 1(8) + 0(4) + 0(2) + 1(1) =$

$16 + 8 + 0 + 0 + 1 = 25$

8) $2 \times 7^3 + 1 \times 7^2 + 2 \times 7^1 + 1 \times 7^0$

$2(343) + 1(49) + 2(7) + 1(1) =$

$686 + 49 + 14 + 1 = 750$

9) $4 \times 7^2 + 6 \times 7^1 + 5 \times 7^0$

$4(49) + 6(7) + 5(1) =$

$196 + 42 + 5 = 243$

10) $3 \times 6^3 + 4 \times 6^2 + 2 \times 6^1 + 1 \times 6^0$

$3(216) + 4(36) + 2(6) + 1(1) =$

$648 + 144 + 12 + 1 = 805$

11) $2 \times (12)^2 + 6 \times (12)^1 + 10 \times (12)^0$

$2(144) + 6(12) + 10(1) =$

$288 + 72 + 10 = 370$

12) $3 \times (20)^2 + 11 \times (20)^1 + 4 \times (20)^0$

$3(400) + 11(20) + 4(1) =$

$1200 + 220 + 4 = 1424$

Problem in Student Text was rewritten after first printing.
This is a solution for $3E4_{20} =$ _____$_{10}$

1) $3^4 = 81$

$$81\overline{)100}\ 1,\ 81,\ 19 \qquad 27\overline{)19}\ 0,\ 0,\ 19 \qquad 9\overline{)19}\ 2,\ 18,\ 1 \qquad 8\overline{)1}\ 0,\ 0,\ 1$$

$$1\overline{)1}\ 1,\ 1,\ 0$$

10201_3

2) $6^3 = 216$

$$216\overline{)245}\ 1,\ 216,\ 29 \qquad 36\overline{)29}\ 0,\ 0,\ 29 \qquad 6\overline{)29}\ 4,\ 24,\ 5 \qquad 1\overline{)5}\ 5,\ 5,\ 0$$

1045_6

3) $5 \times 7^1 + 6 \times 7^0$

$5(7) + 6(1) =$

$35 + 6 = 41$

4) $1 \times 8^2 + 7 \times 8^1 + 3 \times 8^0$

$1(64) + 7(8) + 3(1) =$

$64 + 56 + 3 = 123$

5) $(3 \times 10^2)(7 \times 10^3)(8 \times 10^{-1})$

$(3 \times 7 \times 8)(10^2 \times 10^3 \times 10^{-1})$

$168 \times 10^4 = 1.68 \times 10^6$

2×10^6 (with significant digits)

6) $(6 \times 10^1)(5 \times 10^{-2})(4 \times 10^4)$

$(6 \times 5 \times 4)(10^1 \times 10^{-2} \times 10^4)$

$120 \times 10^3 = 1.20 \times 10^5$

1×10^5 (with significant digits)

7) $\dfrac{(9 \times 10^3)(4 \times 10^{-2})}{(3 \times 10^5)(2 \times 10^{-1})} = \dfrac{(36 \times 10^1)}{(6 \times 10^4)} =$

(6×10^{-3})

8) $\dfrac{(1.4 \times 10^0)(5 \times 10^{-3})}{(3.5 \times 10^5)} = \dfrac{(7 \times 10^{-3})}{(3.5 \times 10^5)} =$

(2×10^{-8})

9) $(10^1)^0 = 10^0 = 1$

10) $(2^2)^{3/2} \cdot (2^4)^2 \cdot (2^6)^{2/3} =$

$2^3 \cdot 2^8 \cdot 2^4 = 2^{15}$

11) $(10^2)^{3/2} \cdot (10^2)^4 =$

$10^3 \cdot 10^8 = 10^{11}$

12) $D^{-1/3} \cdot D^{18/3} \cdot D^{2/3} = D^{19/3}$

13) $\dfrac{880 \text{ yds.}}{1} \times \dfrac{.9 \text{ m}}{1 \text{ yd.}} = 792 \text{ m}$

14) answers will vary
Multiply your weight by .45 kg.

15) $\dfrac{4 \text{ qts}}{1} \times \dfrac{.95 \text{ l}}{1 \text{ qt.}} = 3.8 \text{ liters}$

16) answers will vary
Multiply your weight in kg (#14) by 1000 grams.

17) $\dfrac{1.24 \times 10^6 \text{ mi}^2}{1} \times \dfrac{5.28 \times 10^3 \text{ ft.}}{1 \text{ mi.}} \times \dfrac{5.28 \times 10^3 \text{ ft.}}{1 \text{ mi.}}$

$= 34.6 \times 10^{12} = 3.46 \times 10^{13}$ sq. ft.

18) $(3.46 \times 10^{13}$ sq. ft.$) \div (6 \times 10^9$ people$) =$

$(3.46 \div 6)(10^{13} \div 10^9) = .577 \times 10^4 =$

5.77×10^3 sq. ft. per person or

6×10^3 sq. ft. using significant digits

19) $(B + A)(B - A)$

20) $(C^2 + D^2)(C^2 - D^2)$

$(C^2 + D^2)(C + D)(C - D)$

33D

1) $7^2 = 49$

$$49\overline{)100}\ \ 2,\ 98,\ 2 \qquad 7\overline{)2}\ \ 0,\ 0,\ 2 \qquad 1\overline{)2}\ \ 2,\ 2,\ 0$$

202_7

2) $8^2 = 64$

$$64\overline{)245}\ \ 3,\ 192,\ 53 \qquad 8\overline{)53}\ \ 6,\ 48,\ 5 \qquad 1\overline{)5}\ \ 5,\ 5,\ 0$$

365_8

3) $2 \times 3^3 + 1 \times 3^2 + 2 \times 3^1 + 0 \times 3^0$

$2(27) + 1(9) + 2(3) + 0(1) =$

$54 + 9 + 6 + 0 = 69$

4) $3 \times 4^3 + 2 \times 4^2 + 1 \times 4^1 + 0 \times 4^0$

$3(64) + 2(16) + 1(4) + 0(1) =$

$192 + 32 + 4 + 0 = 228$

5) $(3.2 \times 10^{-2})(8 \times 10^3)(7 \times 10^{-1})$

$(3.2 \times 8 \times 7)(10^{-2} \times 10^3 \times 10^{-1})$

$179.2 \times 10^0 = 1.792 \times 10^2$

2×10^2 (with significant digits)

6) $(3 \times 10^{-3})(5 \times 10^2)$

$(3 \times 5)(10^{-3} \times 10^2)$

$15 \times 10^{-1} = 1.5 \times 10^0$

2×10^0 or 2 (with significant digits)

7) $\dfrac{(1.24 \times 10^4)}{(4 \times 10^{-2})} = (1.24 \div 4)(10^4 \div 10^{-2}) =$

$.31 \times 10^6 = 3.1 \times 10^5$

or 3×10^5 with S.D.

8) $\dfrac{(1 \times 10^6)}{(5 \times 10^6)} = (1 \div 5)(10^6 \div 10^6) =$

$.2 \times 10^0 = 2 \times 10^{-1}$

9) $(2^3)^{4/3} = 2^4 = 16$

10) $X^{4/6} = X^{2/3}$

11) $A^{-10/2} \cdot A^{8/2} \cdot A^{-6/2} \cdot A^{1/2} = A^{-7/2}$

12) $B^5 \cdot A^{-2} \cdot B^3 \cdot A^{-7} = A^{-9}B^8$

13) $\dfrac{2000\ \text{lbs.}}{1} \times \dfrac{.45\ \text{kg}}{1\ \text{lbs.}} = 900\ \text{kg}$

14) $\dfrac{4\ \text{ft.}^2}{1} \times \dfrac{12\ \text{in.}}{1\ \text{ft.}} \times \dfrac{12\ \text{in.}}{1\ \text{ft.}}$

$= 576\ \text{in.}^2$

15) $2.2E = 11 \times 1.5$

$2.2E = 16.5$

$E = 7.5$

16) $AD = BC$

$\dfrac{AD}{C} = B$

17) $\dfrac{3.69 \times 10^6\ \text{mi}^2}{1} \times \dfrac{5.28 \times 10^3\ \text{ft.}}{1\ \text{mi.}} \times \dfrac{5.28 \times 10^3\ \text{ft.}}{1\ \text{mi.}}$

$= 103 \times 10^{12} = 1.03 \times 10^{14}$ sq. ft.

18) $(1.03 \times 10^{14}\ \text{sq. ft.}) \div (6 \times 10^9\ \text{people}) =$

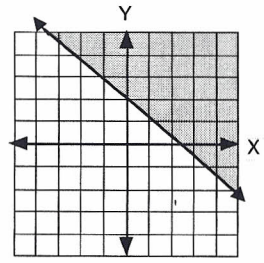
$(1.03 \div 6)(10^{14} \div 10^9) = .172 \times 10^5 =$

1.72×10^4 sq. ft. per person

19) $\dfrac{1.72 \times 10^4}{4.4 \times 10^4} = (1.72 \div 4.4)(10^4 \div 10^4) =$

$(.39 \times 10^0) = 3.9 \times 10^{-1}$ or .39 acre per person

20) $Y \geq -4/5X + 2$



33E

1) $9^2 = 81$

$$81\overline{)100}\ \ 1,\ 81,\ 19 \qquad 9\overline{)19}\ \ 2,\ 18,\ 1 \qquad 1\overline{)1}\ \ 1,\ 1,\ 0$$

121_9

2) $4^3 = 64$

$$64\overline{)245}\ \ 3,\ 192,\ 53 \qquad 16\overline{)53}\ \ 3,\ 48,\ 5 \qquad 4\overline{)5}\ \ 1,\ 4,\ 1 \qquad 1\overline{)1}\ \ 1,\ 1,\ 0$$

3311_4

3) $3 \times 12^3 + 5 \times 12^2 + 10 \times 12^1 + 11 \times 12^0$

$3(1728) + 5(144) + 10(12) + 11(1) =$

$5184 + 720 + 120 + 11 = 6035$

4) $4 \times 5^2 + 0 \times 5^1 + 4 \times 5^0$

$4(25) + 0(5) + 4(1) =$

$100 + 0 + 4 = 104$

5) $(6.02 \times 10^7)(5.07 \times 10^{-1})$

$(6.02 \times 5.07)(10^7 \times 10^{-1})$

$30.5 \times 10^6 = 3.05 \times 10^7$

6) $(2 \times 10^3)(5 \times 10^3)(4 \times 10^2)$

$(2 \times 5 \times 4)(10^3 \times 10^3 \times 10^2)$

$40 \times 10^8 = 4 \times 10^9$

7) $(9 \times 10^{10})(2.1 \times 10^{-5})$

$(9 \times 2.1)(10^{10} \times 10^{-5})$

$18.9 \times 10^5 = 1.89 \times 10^6$

2×10^6 (with significant digits)

8) $\dfrac{(4 \times 10^4)(3 \times 10^4)}{(6 \times 10^1)} = \dfrac{(12 \times 10^8)}{(6 \times 10^1)} =$

(2×10^7)

9) $X^{6/15} + X^{5/15} = X^{11/15}$

10) $X^{2/15}$

11) $X^{10/15} + X^{-3/15} = X^{7/15}$

12) $B^6\ B\ C^{-4}\ C^{-9}\ C^4 = B^7C^{-9}$

13) $\dfrac{100\ \text{mi.}}{1} \times \dfrac{1.61\ \text{km}}{1\ \text{mi.}} = 161\ \text{km}$

14) $\dfrac{14\ \text{yds.}^3}{1} \times \dfrac{3\ \text{ft.}}{1\ \text{yd.}} \times \dfrac{3\ \text{ft.}}{1\ \text{yd.}} \times \dfrac{3\ \text{ft.}}{1\ \text{yd.}} =$

$= 378\ \text{ft.}^3$

15) $.03W = 2 \times 1.5$

$3W = 300$

$W = 100$

16) $AX^2 = X^2YZ^2$

$A = \dfrac{X^2YZ^2}{X^2} = YZ^2$

17) $(3X + 2)(X + 4) = 0$

$X = -2/3,\ X = -4$

$3(-2/3)^2 + 14(-2/3) + 8 = 0$

$3(4/9) - 28/3 + 8 = 0$

$4/3 - 28/3 + 8 = 0$

$0 = 0$

$3(-4)^2 + 14(-4) + 8 = 0$

$3(16) - 56 + 8 = 0$

$48 - 56 + 8 = 0$

$0 = 0$

18) $Y = 2/3X + 3$

19) $m = 2/3$

20) $m = -3/2$