

State Competency Test Review

Solutions — package #1

FORM A

Q 1, 2, 3, 4

$$\textcircled{1} \quad 3 - 9 + 8 \cdot 5$$

$$3 - 9 + 40$$

$$43 - 9$$

$$\textcircled{34}$$

$$\textcircled{2} \quad 16 - 20 \div 10 + 3$$

$$16 - 2 + 3$$

$$19 - 2 = \textcircled{17}$$

$$\textcircled{3} \quad 6 + 3 \cdot 6 \div 3 \cdot 4 - 3$$

$$18 \div 3 \cdot 4$$

$$6 \cdot 4$$

$$24$$

$$6 + 24 - 3 = 30 - 3 = \textcircled{27}$$

$$\textcircled{4} \quad 25 - (4)^2 \div (11 - 7) \cdot 5$$

$$25 - 16 \div (4) \cdot 5$$

$$25 - 4 \cdot 5$$

$$25 - 20 = \textcircled{5}$$

$$\textcircled{5} \quad (12 - 9)^2 \div 3$$

$$(3)^2 \div 3$$

$$9 \div 3 = \textcircled{3}$$

$$\textcircled{6} \quad (3 - 7)^2 - (3 + 3)^3$$

$$(-4)^2 - (6)^3$$

$$16 - 216$$

$$\textcircled{-200}$$

$$6 \cdot 6 \cdot 6$$

$$= 36 \cdot 6$$

$$= 216$$

$$\textcircled{7} \quad 2 + 2(9 - 3)^2$$

$$2 + 2(6)^2$$

$$2 + 2(36) = 2 + 72 = \textcircled{74}$$

$$\textcircled{8} \quad |-16| + |-5| - |16|$$

$$16 + 5 - 16 = \textcircled{5}$$

$$\textcircled{9} \quad -|-3| + |-9|$$

$$= -3 + 9 = \textcircled{6}$$

$$\textcircled{10} \quad |5 + (-16)| + 5$$

$$|-11| + 5 = 11 + 5$$

$$= \textcircled{16}$$

$$\textcircled{11} \quad -8z - 6(z + 5) + 5$$

$$-8z - 6z - 30 + 5$$

$$\textcircled{-14z - 25}$$

$$\textcircled{12} \quad -5[-6(t - 3) + t]$$

$$-5[-6t + 18 + t]$$

$$-5[-5t + 18]$$

$$\textcircled{25t - 90}$$

$$\textcircled{1} 4w^2 + 5w + 3 \quad w = -4$$

$$4(-4)^2 + 5(-4) + 3$$

$$4(16) - 20 + 3$$

$$64 + 3 - 20 = 67 - 20 = \textcircled{47}$$

$$\textcircled{2} x = -6 \quad y = 2 \quad z = -7$$

$$-4xy - z$$

$$-4(-6)(2) - (-7)$$

$$48 + 7 = \textcircled{55}$$

$$\textcircled{3} 4(-4q + 9) = -2q + 3$$

$$-16q + 36 = -2q + 3$$

$$-16q + 2q = 3 - 36$$

$$-14q = -33$$

$$q = \textcircled{\frac{33}{14}}$$

$$\textcircled{4} -8(-3x - 8) = 8x - 7$$

$$24x + 64 = 8x - 7$$

$$24x - 8x = -7 - 64$$

$$16x = -71$$

$$x = \textcircled{\frac{-71}{16}}$$

$$\textcircled{5} -8(3y + 6) = 2(y + 3)$$

$$-24y - 48 = 2y + 6$$

$$-24y - 2y = 6 + 48$$

$$-26y = 54$$

$$y = \frac{-54}{26} = \textcircled{\frac{-27}{13}}$$

$$\textcircled{6} \frac{8}{3}r - 3 = 5$$

$$\text{lcd} = 3$$

$$3 \cdot \frac{8}{3}r - 3 \cdot 3 = 5 \cdot 3$$

$$8r - 9 = 15$$

$$8r = 15 + 9$$

$$8r = 24$$

$$r = \textcircled{3}$$

$$\textcircled{7} -\frac{7}{4}t - 8 = -4$$

$$\text{lcd} = 4$$

$$4 \cdot -\frac{7}{4}t - 8 \cdot 4 = -4 \cdot 4$$

$$-7t - 32 = -16$$

$$-7t = -16 + 32$$

$$-7t = 16$$

$$t = \textcircled{\frac{-16}{7}}$$

$$\textcircled{8} \frac{5}{4}q + 2 = \frac{7}{4}$$

$$\text{lcd} = 4$$

$$4 \cdot \frac{5}{4}q + 2 \cdot 4 = \frac{7}{4} \cdot 4$$

$$5q + 8 = 7$$

$$5q = 7 - 8$$

$$5q = -1$$

$$q = \textcircled{\frac{-1}{5}}$$

9) Solve for u

$$X = -2z - 4u$$

$$X + 2z = -4u$$

$$\frac{X}{-4} + \frac{2z}{-4} = \frac{-4u}{-4}$$

$$\boxed{-\frac{1}{4}X - \frac{1}{2}z = u}$$

10) $u = 6zy$ for y

$$\frac{u}{6z} = \frac{6zy}{6z}$$

$$\boxed{\frac{L \cdot u}{6z} = y}$$

11) $P = 2L + 2w$ for w

$$P - 2L = 2w$$

$$\frac{P}{2} - \frac{2L}{2} = \frac{2w}{2}$$

$$\boxed{\frac{1}{2}P - L = w}$$

12) $A = \frac{BH}{2}$ for H

$$\text{lcd} = 2$$

$$2A = \frac{BH}{\cancel{2}}$$

$$\frac{2A}{B} = \frac{BH}{B}$$

$$\boxed{\frac{2A}{B} = H} = \left(2 \cdot \frac{A}{B}\right)$$

13) $A = \pi r^2$ for r

$$\frac{A}{\pi} = \frac{\pi r^2}{\pi}$$

$$\frac{A}{\pi} = r^2$$

$$\sqrt{\frac{A}{\pi}} = r$$

$$\boxed{\sqrt{A \div \pi} = r}$$

① $x = \#$

$$6x + 19 = x^2 - 10$$

② $x + 2 = 2x + 20$

③ \$304 after 20% discount

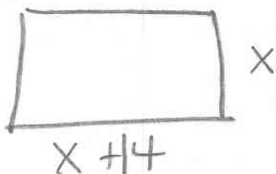
BP = A

$$B(0.80) = 304$$

$$B = \frac{304}{0.80} = \boxed{\$380}$$

$$\begin{array}{r} 0.80 \overline{) 304.00} \\ \underline{240} \\ 640 \\ \underline{640} \\ 00 \end{array}$$

④



$$L = x + 14$$

$$W = x$$

$$2L + 2W = P$$
$$2(x+14) + 2x = 88$$

$$2x + 28 + 2x = 88$$

$$4x = 88 - 28$$

$$4x = 60$$

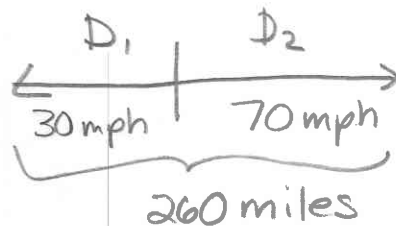
$$x = 15$$

$$L = \boxed{29 \text{ feet}}$$

$$L = 15 + 14 = 29$$

$$W = 15 = 15$$

⑤



$$D = RT \quad D_1 + D_2 = 260$$

$$D_1 = 30t$$

$$D_2 = 70t$$

$$D_1 + D_2 = 260$$

$$30t + 70t = 260$$

$$100t = 260$$

$$t = \frac{260}{100} = \left(\frac{13}{5}\right)$$

⑥

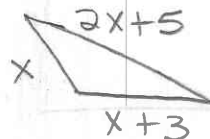
$$I = PRT$$

$$220 = P(0.08)(4)$$

$$\frac{220}{(0.08)(4)} = P = \boxed{\$687.50}$$

⑦

$$P = 24$$



smallest = x

$$x + (x+3) + (2x+5) = 24$$

$$4x + 8 = 24$$

$$4x = 24 - 8 = 16$$

$$\boxed{x = 4 \text{ in}}$$

Q 9, 10, 11
continued

⑧ $\frac{\text{miles}}{\text{gal}} = \frac{387}{14} = \frac{x}{19}$

If you can't find an answer that matches, check the cross product.

$(387)(19) = (14)(x)$

⑨ $\frac{\#}{\$} = \frac{41}{92} = \frac{x}{151}$

$(41)(151) = (92)(x)$

Q 12, 13, 14

① $(a^4 b^3)^3 (a^3 b^3)$

$a^{12} b^9 a^3 b^3$

$a^{15} b^{12}$

② $\frac{(2x^6 y^3)^3}{x^3}$

$\frac{2^3 x^{18} y^9}{x^3}$

$8x^{15} y^9$

③ $(2t^4 x^0)^5$

$(2t^4 (1))^5$

$2^5 t^{20} = 32t^{20}$

④

$\frac{x^5 y^1 z^7}{x^4 y^6 z^2}$

$= \frac{x z^5}{y^6}$

⑤

$\frac{x^3 y^4 z^6}{x^9 y^0 z^3}$

$= \frac{y^4 z^3}{x^6}$

⑥

$\frac{a^{-1} b^3}{a^1 b^{-1}}$

$= \frac{b^3 b^1}{a^1 a^1} = \frac{b^4}{a^2}$

⑦

$\frac{a^{-4} b^5}{a^3 b^{-3}}$

$= \frac{b^5 b^3}{a^3 a^4} = \frac{b^8}{a^7}$

$= b^8 \cdot \frac{1}{a^7}$

⑧

$(v^8 z^0)^{-2} = v^{-16} z^0$

$= \frac{1}{v^{16}}$

⑨

$(z^4 w^{-3})^{-9} = z^{-36} w^{27}$

$= \frac{w^{27}}{z^{36}}$

$$\begin{aligned} \textcircled{1} \quad 1.85 \times 10^6 &= 1.85 \\ &\quad \xrightarrow{\text{6 spaces}} \\ &= \boxed{1,850,000} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 9.54 \times 10^{-7} &= 9.54 \\ &\quad \xleftarrow{\text{7 spaces}} \\ &= \boxed{0.000000954} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad 3,120,000 &= \boxed{3.12 \times 10^7} \\ &\quad \xleftarrow{\text{7 spaces}} \end{aligned}$$

$$\textcircled{4} \quad 0.000000285 = \boxed{2.85 \times 10^{-7}}$$

$$\begin{aligned} \textcircled{5} \quad (7x^2 - 2x - 8) + (6x^2 - 6x + 5) \\ \boxed{13x^2 - 8x - 3} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad (7x^2 + 2x - 7) - (4x^2 - 8x + 7) \\ 7x^2 + 2x - 7 - 4x^2 + 8x - 7 \\ \boxed{3x^2 + 10x - 14} \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad (5x^2 - 2x + 4) - (4x^2 - 5x - 5) \\ 5x^2 - 2x + 4 - 4x^2 + 5x + 5 \\ \boxed{x^2 + 3x + 9} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad 7x(5x - 4) \\ \boxed{35x^2 - 28x} \end{aligned}$$

$$\textcircled{9} \quad -6x(-7x + 5)$$

$$\boxed{42x^2 - 30x}$$

$$\begin{aligned} \textcircled{10} \quad (4x - 9)(2x - 3) \\ 8x^2 - 12x - 18x + 27 \end{aligned}$$

$$\boxed{8x^2 - 30x + 27}$$

$$\begin{aligned} \textcircled{11} \quad (5x + 6)(-3x - 2) \\ -15x^2 - 10x - 18x \\ \quad \quad \quad -12 \end{aligned}$$

$$\boxed{-15x^2 - 28x - 12}$$

$$\textcircled{12} \quad (5x + 2)(9x^2 + 4x - 5)$$

$$45x^3 + 20x^2 - 25x + 18x^2 + 8x - 10$$

$$\boxed{45x^3 + 38x^2 - 17x - 10}$$

$$\textcircled{13} \quad (5x^2 + 8x + 5) \div 2x$$

$$\frac{5x^2}{2x} + \frac{8x}{2x} + \frac{5}{2x}$$

$$\frac{5x}{2} + 4 + \frac{5}{2x}$$

$$\boxed{\frac{5}{2}x + 4 + \frac{5}{2x}}$$

① $34w^{20}u^{18} + 14w^{32}u^{16} + 22w^{12}u^6$
 (pick smallest power for each letter)

$2w^{12}u^6 (17w^8u^{12} + 7w^{20}u^{10} + 11)$

⑧ $8w^2 - 41w + 5$

$ac = 8(5) = 40$

$-40 \mid -1 \quad -41$

$8w^2 - 40w - w + 5$
 $8w(w - 5) - 1(w - 5)$

$(w - 5)(8w - 1)$

② $45w^9t^{16} - 27w^6t^4$

$9w^6t^4 (5w^3t^{12} - 3)$

③ $x^2 - 4 = (x + 2)(x - 2)$

④ $y^2 - 16t^2$ difference of perfect squares

$= (y + 4t)(y - 4t)$

⑤ $5s^2 + 4sy + 5s + 4y$ (grouping)

$s(5s + 4y) + 1(5s + 4y)$

$(5s + 4y)(s + 1)$

⑥ $xt + xk + at + ak$ (grouping)

$x(t + k) + a(t + k)$

$(t + k)(x + a)$

⑨ $7q^2 - 47q + 30$

$(7q - 5)(q - 6)$

⑦ $2t^2 - t - 1$

$ac = (2)(-1) = -2$

$-2 \mid 1 \quad -1$

$2t^2 - 2t + t - 1$
 $2t(t - 1) + 1(t - 1)$

$(t - 1)(2t + 1)$

⑩ $8z^2 - 35z + 12$

$ac = (8)(12) = 96$

$96 \mid 1$
 $48 \mid 2$
 $32 \mid 3 \quad 35$

$8z^2 - 32z - 3z + 12$

$8z(z - 4) - 3(z - 4)$

$(z - 4)(8z - 3)$

$$\textcircled{1} \frac{x^2 - x - 42}{x^2 - 3x - 28} = \frac{(x+6)(x-7)}{(x-7)(x+4)} = \boxed{\frac{x+6}{x+4}}$$

$$\textcircled{2} \frac{3x^2 - 7x + 4}{2x^2 - 5x + 3} = \frac{(3x-4)(x-1)}{(2x-3)(x-1)} = \boxed{\frac{3x-4}{2x-3}}$$

$$\textcircled{3} \frac{x^2 + 5x + 6}{2x^2 + 3x - 2} = \frac{(x+3)(x+2)}{(2x-1)(x+2)} = \boxed{\frac{x+3}{2x-1}}$$

$$\textcircled{4} x^2 + 10x + 21 = 0$$

$$(x+7)(x+3) = 0$$

$$x+7=0 \quad x+3=0$$

$$\boxed{x=-7} \quad \boxed{x=-3}$$

$$\textcircled{8} 25x^2 - 5x - 2 = 0$$

$$(5x+1)(5x-2) = 0$$

$$5x+1=0$$

$$5x-2=0$$

$$5x = -1$$

$$5x = 2$$

$$\boxed{x = -\frac{1}{5}}$$

$$\boxed{x = \frac{2}{5}}$$

$$\textcircled{5} x^2 - 3x - 10 = 0$$

$$(x-5)(x+2) = 0$$

$$x-5=0 \quad x+2=0$$

$$\boxed{x=5}$$

$$\boxed{x=-2}$$

$$\textcircled{9} 14x^2 + 37x + 5 = 0$$

$$(7x+1)(2x+5) = 0$$

$$7x+1=0$$

$$2x+5=0$$

$$7x = -1$$

$$2x = -5$$

$$\boxed{x = -\frac{1}{7}}$$

$$\boxed{x = -\frac{5}{2}}$$

$$\textcircled{6} x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x-3=0 \quad x+2=0$$

$$\boxed{x=3}$$

$$\boxed{x=-2}$$

$$\textcircled{7} 10x^2 - x - 21 = 0$$

$$(5x+7)(2x-3) = 0$$

$$5x+7=0$$

$$2x-3=0$$

$$5x = -7$$

$$\boxed{x = -\frac{7}{5}}$$

$$2x = 3$$

$$\boxed{x = \frac{3}{2}}$$

$$\begin{aligned} \textcircled{1} \quad \sqrt{20z^7y^8} &= \sqrt{2 \cdot 2 \cdot 5 \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y} \\ &= \boxed{2z^3y^4\sqrt{5z}} \end{aligned}$$

$$\textcircled{2} \quad 3\sqrt{64w^7u^4} = \boxed{\frac{3 \cdot 8w^3u^2\sqrt{u}}{24}}$$

$$\textcircled{3} \quad \sqrt{32} + \sqrt{8} = 4\sqrt{2} + 2\sqrt{2} = \boxed{6\sqrt{2}}$$

$$\begin{array}{r} 2 \overline{)32} \\ \underline{2} \\ 2 \\ \underline{2} \\ 2 \\ \underline{2} \\ 0 \end{array} \quad \begin{array}{r} 2 \overline{)8} \\ \underline{2} \\ 0 \\ \underline{2} \\ 0 \end{array}$$

$$\textcircled{4} \quad \sqrt{75} - \sqrt{3} = 5\sqrt{3} - \sqrt{3} = \boxed{4\sqrt{3}}$$

$$\textcircled{5} \quad \sqrt{3}(\sqrt{2} + 2\sqrt{5}) = \boxed{\sqrt{6} + 2\sqrt{15}}$$

$$\textcircled{6} \quad \sqrt{2}(\sqrt{5} + 4\sqrt{7}) = \boxed{\sqrt{10} + 4\sqrt{14}}$$

$$\begin{aligned} \textcircled{7} \quad \sqrt{5}(4\sqrt{15} - \sqrt{5}) &= 4\sqrt{3 \cdot 5 \cdot 5} - \sqrt{5 \cdot 5} \\ &= 5 \cdot 4\sqrt{3} - 5 = \boxed{20\sqrt{3} - 5} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad 7(3x+9) &< 17 \\ 21x + 63 &< 17 \\ 21x &< 17 - 63 \\ 21x &< -46 \end{aligned}$$

$$\boxed{x < \frac{-46}{21}}$$

$$\begin{aligned} \textcircled{9} \quad 18x + 14 &< 50x + 9 \\ 18x - 50x &< 9 - 14 \\ -32x &< -5 \end{aligned}$$

$$\boxed{x > \frac{5}{32}}$$

$$\boxed{x > \frac{-2}{3}}$$

$$\begin{aligned} \textcircled{10} \quad 23x + 1 &< 32x + 7 \\ 23x - 32x &< 7 - 1 \\ -9x &< 6 \\ x &> \frac{-6}{9} \end{aligned}$$

① x-intercept ($y=0$)

$$-2x - 6y = 7$$

$$-2x - 6(0) = 7$$

$$-2x = 7$$

$$x = -\frac{7}{2}$$

$$\left(-\frac{7}{2}, 0\right)$$

② y-intercept ($x=0$)

$$6x - 4y = 9$$

$$6(0) - 4y = 9$$

$$-4y = 9$$

$$y = -\frac{9}{4}$$

$$\left(0, -\frac{9}{4}\right)$$

③ x-intercept ($y=0$)

$$-6x - 9y = -2$$

$$-6x - 9(0) = -2$$

$$-6x = -2$$

$$x = \frac{-2}{-6} = \frac{1}{3}$$

$$\left(\frac{1}{3}, 0\right)$$

④ y-intercept ($x=0$)

$$2x - 6y = -8$$

$$2(0) - 6y = -8$$

$$-6y = -8$$

$$y = \frac{-8}{-6} = \frac{4}{3}$$

$$\left(0, \frac{4}{3}\right)$$

⑤ $y = 2x - 3$

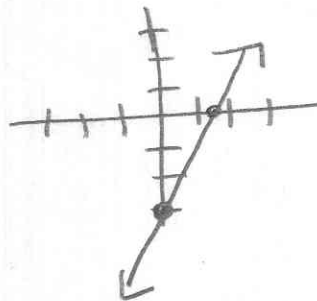
x	y
0	-3
$\frac{3}{2}$	0

$$0 = 2x - 3$$

$$3 = 2x$$

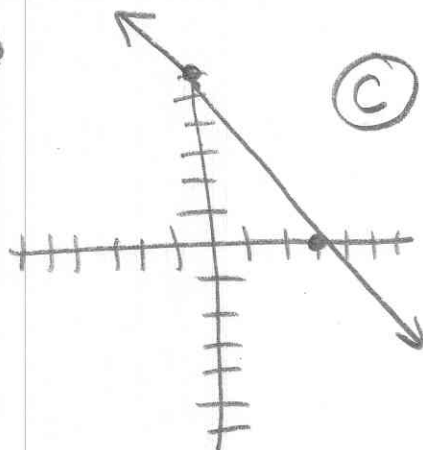
$$\frac{3}{2} = x$$

C



⑥ $4x + 2y = 12$

x	y
0	6
3	0



C

⑦ $2x - 3y = 10$

x	y
0	$-\frac{10}{3} = -3\frac{1}{3}$
5	0

$$2(0) - 3y = 10$$

$$y = -\frac{10}{3}$$

$$2x - 3(0) = 10$$

$$x = 5$$

A

