Review for Post-Test
'13 - '14 → Solutions

① $\sqrt[3]{x} = \sqrt[3]{x^1} = x^{\frac{1}{3}}$ so **C**

② $\frac{1}{x^4} = x^{-4}$ (moves top to bottom, change signs on powers) so **A**

③ $\frac{1}{\sqrt[4]{x}} = \frac{1}{x^{\frac{1}{4}}} = x^{-\frac{1}{4}}$ so **B**

④ $\frac{33 \text{ hrs}}{1.5 \text{ hrs/quiz}} = 22 \text{ quizzes}$ so **C**

⑤ 80 mph → 80 miles driven in 1 hr.

$\frac{80 \text{ miles}}{40 \text{ miles/gallon}} = 2 \text{ gallons}$ so **B**

⑥ $\frac{10 \text{ gallons}}{2 \text{ gallons/hr}} = 5 \text{ hours of driving}$

$5(60 \text{ min}) = 300 \text{ min.}$ so **B**

(7) $x^2 - 10x + 16$ → tells us both signs are "same"

↳ tells us both signs are "−"

So $(x - 8)(x - 2) \Rightarrow$ **A**

(8) $x^2 + 2x = 8$ (First, we need a Zero)

$x^2 + 2x - 8 = 0$ (Now we factor)

$(x+4)(x-2) = 0$ (Now set each factor = 0 & solve)

$x + 4 = 0$ | $x - 2 = 0$

$x = -4$ | $x = 2 \Rightarrow$ **B**

(9) $(3x + 7)(2x - 9) = 0$ (Set each factor = 0 & solve)

$3x + 7 = 0$ | $2x - 9 = 0$

$3x = -7$ | $2x = 9$

$x = -\frac{7}{3}$ | $x = \frac{9}{2} \Rightarrow$ **D**

(10) $y = x^2 - 6x + 8$ → We'll complete the square.

$= x^2 - 6x + 9 + 8 - 9$ ← remember to subtract 9, too.

↑ Half (−3) : Square : 9 : Add

$= x^2 - 6x + 9 - 1$

$= (x-3)^2 - 1 \Rightarrow$ vertex is $(+3, -1) \Rightarrow$ **C**

(11) $y = 4(x+5)^2 - 3 \Rightarrow$ vertex is $(-5, -3) \Rightarrow$ **A**

↑ opens up

∪ → vertex is here

(12) ∪ → minimum y-value is -3 $\Rightarrow$ **D**

$(-5, -3)$

(13) $5x + 10y = 40$

$(0, \_\_) \rightarrow 0 + 10y = 40 \rightarrow y = 4 \rightarrow (0, 4)$

↑ y-intercept

$(\_\_, 0) \rightarrow 5x + 0 = 40 \rightarrow x = 8 \rightarrow (8, 0) \Rightarrow$ **A**

↑ x-intercept

(14) $6x + 8y = 16$ (Solve for $y \rightarrow$)

$8y = -6x + 16$

$y = -\frac{6}{8}x + 2 \rightarrow y = -\frac{3}{4}x + 2 \Rightarrow$ **C**

(15) $\underline{15} \rightarrow$ the slope gives rate of change $\left(\frac{\text{points}}{\text{hr}}\right) \Rightarrow$ **C**

(16) B → $\frac{\Delta \text{ Score}}{\Delta \text{ time studied (in hours)}}$

(17) $m = \frac{1}{15}$ ($\frac{\text{miles (change in } y)}{\text{minutes (change in } x)}$ so $\frac{1}{15}$ mile/minute

⇒ A

(18) $y = 3x^2 - 18x + 24$

this is y-int (put 0 in for x) ⇒ (0, 24)

⇒ B

(19) $y = 3x^2 - 18x + 24$ (Set $y = 0$)

$0 = 3(x^2 - 6x + 8)$ → factor out a 3

$= 3(x-4)(x-2)$ → now, factor $x^2 - 6x + 8$

$3 = 0$ NAH! | $x - 4 = 0$, $x = 4$ | $x - 2 = 0$, $x = 2$ ⇒ intercepts are $\{2, 4\}$ ⇒ B

(20) $y = 3x^2 - 18x + 24$: We seek vertex

$a = 3$, $b = -18$

$x = -\frac{b}{2a}$

so $x = -\frac{(-18)}{2(3)} = \frac{18}{6} = 3$

Now "plug 3 in for x to find y value"

$y = 3(3)^2 - 18(3) + 24$

$= 27 - 54 + 24 \Rightarrow -3$

∴ ∪ ← min @ (3, -3)

⇒ B

(21) Avg speed = Slope get y values

"plug in 0 & 1 as x values"

time 0 → (0, 400)

time 1 → (1, 384)

So Avg speed for 1st second = $\frac{384-400}{1-0} = \frac{-16}{1} = -16$

∴ [D] the minus indicates motion was ↓

(22) Need to find how long 'till she hits water

So set $y=0$

$0 = -16x^2 + 400$ (now solve for x)

$16x^2 = 400$

$x^2 = 25$

$x = \pm 5$ so $\underline{5}$ seconds passes till she hits the water

∴ Our ordered pairs are

(0, 400)
(5, 0) → Avg speed for whole trip = $\frac{400-0}{0-5} = \frac{400}{-5} = -80$

∴ [D] again, the minus indicates ↓ motion

(23) First find Area of whole circle

$A = \pi(6)^2 = 36\pi$

The shaded sector is $\frac{120^\circ}{360^\circ}$ or $\frac{1}{3}$ of the circle

So its area is $\frac{1}{3}(36\pi) = 12\pi \Rightarrow$ [C]

(24) $\measuredangle CBA = 80$ means $\overset{\frown}{CA} = 80^\circ$

$\measuredangle CKA$ is an inscribed $\measuredangle$ (its measure is $\frac{1}{2}\overset{\frown}{CA}$)

$\Rightarrow \measuredangle CKA = 40^\circ \Rightarrow$ **D**

(25) 1) Find area of whole circle ($\pi 10^2 = 100\pi$)

2) Find area of sector $\overset{A}{\underset{O}{\triangle}}\overset{}{\underset{B}{}}$ $\Rightarrow$ ($\frac{90}{360}$ or $\frac{1}{4}$ of 100π) $= 25\pi$

3) Find area of $\overset{A}{\underset{O}{\triangle}}\overset{}{\underset{B}{}}$

$(\frac{1}{2} \cdot 10 \cdot 10) = 50$

$\Rightarrow$ Area shaded $= 25\pi - 50$ or $28.5 \Rightarrow$ **A**

(26) $4x + 2y = 12$

Pt A $(0, \_\_) \Rightarrow 2y = 12 \Rightarrow (0, 6)$ ($y = 6$)

Pt B $(\_\_, 0) \Rightarrow 4x = 12 \Rightarrow (3, 0)$ ($x = 3$)

M is midpoint, so $(\frac{0+3}{2}, \frac{6+0}{2}) = (1.5, 3)$

$\Rightarrow$ **B**

(27) $RS = \sqrt{(4-0)^2 + (5-0)^2}$

$= \sqrt{16+25} = \sqrt{41}$

$RT = \sqrt{(6-0)^2 + (2-0)^2}$

$= \sqrt{36+4}$

$= \sqrt{40} = 2\sqrt{10}$

$ST = \sqrt{(6-4)^2 + (2-5)^2}$

$= \sqrt{4+9} = \sqrt{13}$

$\therefore$ perimeter $= \sqrt{41} + \sqrt{13} + 2\sqrt{10}$

$\Rightarrow$ **C**

(28) Vol. of Cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}(\pi)(6)^2(10)$

$= \frac{1}{3}.\pi.36.10 = 120\pi = 377.0 \Rightarrow$ **C**

(29) Figure is composed of a cylinder & a sphere ($\frac{1}{2}$ on each end)

Vol. of Sphere $= \frac{4}{3}.\pi.r^3$ $\quad (r = \frac{5}{2} = 2.5)$

$= \frac{4}{3}.\pi.(2.5)^3 = 20.8\overline{3}\,\pi$

Vol. of Cylinder $= \pi r^2 h$

$= \pi(2.5)^2(10) = 62.5\pi$

Total Volume $= 20.8\overline{3}\pi + 62.5\pi = 83.\overline{3}\,\pi$ or 261.8

$\Rightarrow$ **B**

(30) $V = Bh$ ← height

↑ area of base (a Δ) $A = \frac{1}{2}bh$

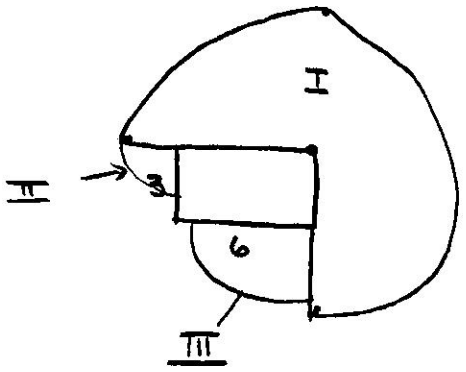
$= \frac{1}{2}(4)(3)(7)$

$= 42 \Rightarrow$ **C**

(31) Scale factor is 4:1 $\Rightarrow$ area comparison is SQUARE of scale factor $\Rightarrow$ 16:1 $\Rightarrow$ **C**

(32) Scale factor is 3:1 → Volume comparison is CUBE of scale factor ⇒ 27:1 ⇒ [C]

(33)



$I \Rightarrow \frac{3}{4}(\pi r^2)$

$= \frac{3}{4} \cdot \pi \cdot 8^2 = 48\pi$

$II \Rightarrow \frac{1}{4}(\pi r^2)$

$\frac{1}{4}(\pi \cdot 2^2) = \pi$

$III \Rightarrow \frac{1}{4}(\pi r^2)$

$\frac{1}{4}(\pi \cdot 5^2) = 6\frac{1}{4}\pi$

Total Area $55\frac{1}{4}\pi$

or 173.6

⇒ [D]

(34) [D]

(35) [A]

(36) [C]

(37) $\frac{170}{690} = .2464 \Rightarrow$ [B]

(38) $\frac{35}{245} = .1429 \Rightarrow$ [D]

(39) $\frac{15}{120} = .125 \Rightarrow$ [B]

(40) $\frac{30+44+54+50+36+30}{6} = \frac{244}{6} = 40.\overline{6} \Rightarrow$ **B**

(41) $\frac{280+240+220+295+300+350}{6} = \frac{1685}{6} \Rightarrow 280.8\overline{3} \Rightarrow$ **D**

(42) Range (Dad)

$54 - 30$

24

Range (Mom)

$350 - 220$

130

$\Rightarrow$ **A**

(43) $z = \frac{x-\mu}{\sigma} \Rightarrow z = \frac{55-40}{10} = \frac{15}{10} = 1.5 \Rightarrow$ **A**

(44) $z = \frac{x-\mu}{\sigma} \Rightarrow 1.2 = \frac{x-50}{10}$ (Multiply by 10)

$12 = x - 50$

$62 = x \Rightarrow$ **D**

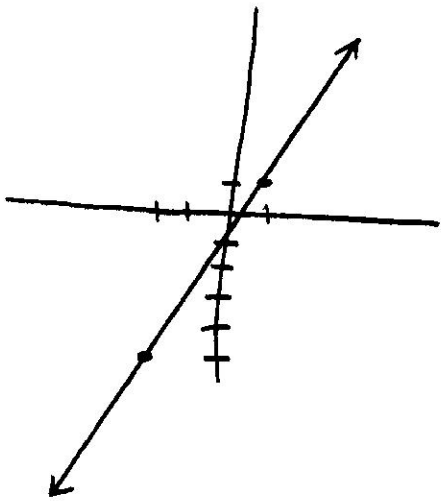
Free Response Questions

(1) $\sqrt[2]{\frac{x^7 z^4}{y^6}} \Rightarrow \frac{x^{\frac{7}{2}} z^{\frac{4}{2}}}{y^{\frac{6}{2}}} = \frac{x^{\frac{7}{2}} z^2}{y^3} \Rightarrow x^{\frac{7}{2}} y^{-3} z^2$

(2A) $120 \cdot 8 \cdot 6 \cdot 5 =$ \$28,800 profit each summer

(2B) $\frac{115,200}{28,800} =$ 4 summers

(3A)



(3B)

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-(-5)}{1-(-2)}$$

$$= \frac{1+5}{1+2}$$

$$= \frac{6}{3} = 2$$

(3C) $y = mx + b$ [we know m, seek to find b]
use either point – I'll use (1,1)

$1 = 2 \cdot 1 + b$

$1 = 2 + b$

$-1 = b \Rightarrow y = 2x - 1$

(3D) y-intercept = b $\Rightarrow$ -1 or $(0,-1)$

(3E) x-intercept → set $y = 0$ ☺

$0 = 2x - 1$

$1 = 2x$

$\frac{1}{2} = x$ or $\left(\frac{1}{2}, 0\right)$

④ $y = -2x^2 + 8x + 3$ — Factor -2 out of x terms ☺

$= -2(x^2 - 4x \quad) + 3$

Half : Square : Add

(-2) $\quad 4$

$= -2(x^2 - 4x + 4) + 3 + 8$

Add 8 ⇒ net change = 0 ☺

really a change of -8

$y = -2(x-2)^2 + 11$

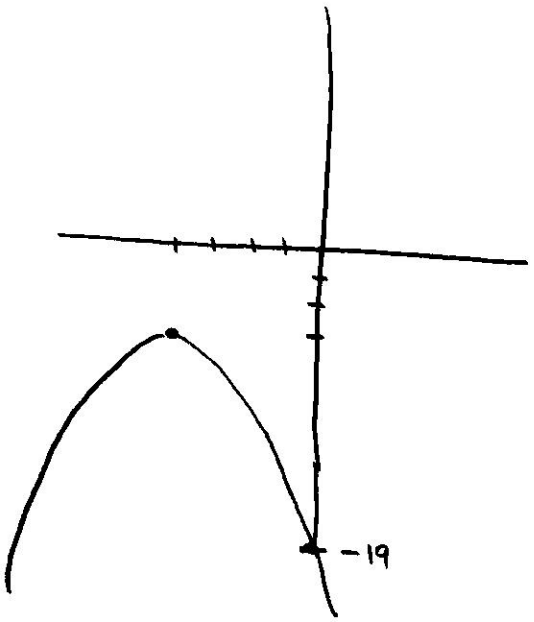
⑤A y intercept is -19 ← $y = -x^2 - 8x - 19$ (plug in 0 for x)

⑤B there Are none: (See # 5D below)

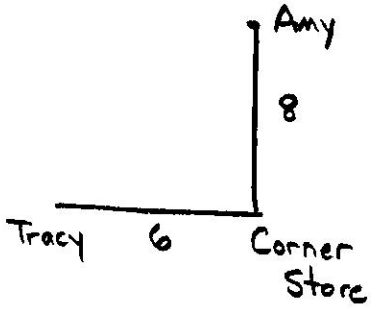
⑤C Vertex = $(-4, -3)$ → $(x-h)^2 + k$ for $y = -(x+4)^2 - 3$

$h = -4$, $k = -3$

⑤D



(6A)



$\Rightarrow 6 + 8 =$ 14 blocks

(6B) $d = \sqrt{(7-1)^2 + (10-2)^2}$

$= \sqrt{6^2 + 8^2}$

$= \sqrt{36+64} = \sqrt{100} =$ 10 blocks

(6C) Counted $\longrightarrow$ + $\uparrow$

Used distance formula $\swarrow$

(6D) Pond is at $(4, 6)$

(7A) $V = \pi r^2 h$

$= \pi (12)^2 (20) =$ 2880π or 9047.787 cubic cm

(7B) $d = 4 \Rightarrow r = 2$

$V = \frac{4}{3}\pi r^3$

$= \frac{4}{3} \cdot \pi (2)^3 =$ $10\frac{2}{3}\pi$ or 33.510 cubic cm

(7C) $\frac{9047.787}{35.510} = 254.795$ scoops

(7D) Assuming 254 scoops $\rightarrow$ $254 \cdot 3.20 = \$812.80$

(8A) Area of base (A square) $= 12^2 = 144\ in^2$

(8B) Area of a side (A rectangle) $= 12 \cdot 18 = 216\ in^2$

(8C) Surface Area = Base + 4 Sides (No top)

$= 144 + 4(216)$

$= 1008\ in^2$

(8D) $V = l \cdot w \cdot h$

$= (12)(12)(18) = 2592\ in^3$

(8E)

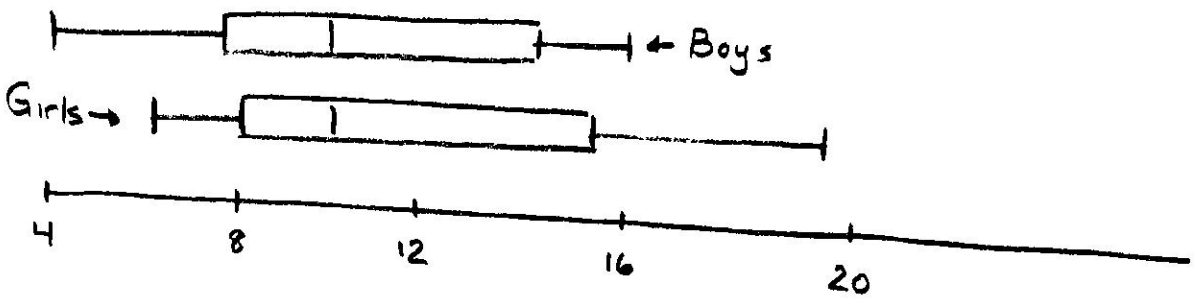
Base + 4 Sides

$(144) \cdot (.20) + 4(216)(.10)$

$\$28.80 + \$86.40 = \$115.20$

(9)

A]



(B) Same medians for Boys & Girls (10)
Shortest reaction times were scored by Boys (4)
Longest reaction time was scored by Girls (19)
Upper Quartiles were similar (13/15)
I'd say most scores were similar.

(10A)

$$\frac{10+25}{160} = \frac{35}{160} = 21.875\%$$

(10B)

$$40 + 35 + 20 = 95$$

(11A)

English: $z = \frac{75-72}{5} = \frac{3}{5} = .6$

Science: $z = \frac{94-90}{3} = \frac{4}{3} = 1.33$

History: $z = \frac{70-55}{10} = \frac{15}{10} = 1.5$

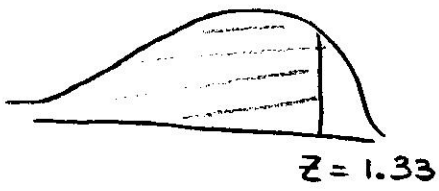
$z = .6$

$z = 1.33$

$z = 1.5$

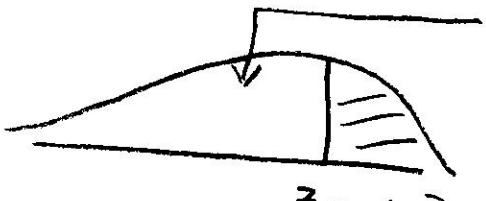
(11B) History [largest z score]

(11C)



→ .9082 or 90.82%

(11D)



this area from table is .7257

→ so this area is

1.0000 − .7257

= .2743 or 27.43%