12.1 Practice Test 1 Explanations

Question 1: E

Cross Multiply

$$\frac{5}{x} = \frac{0.2}{1}$$

$$\frac{0.2}{0.2} = \frac{5}{0.2}$$

$$x = 25$$

or plug in answer choices for x

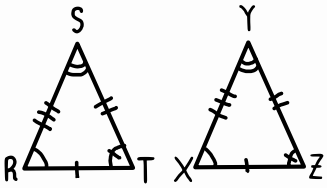
Question 2: K

Corresponding sides and angles are in the same position

$\angle R \cong \angle X$ $\quad \overline{RS} \cong \overline{XY}$

$\angle S \cong \angle Y$ $\quad \overline{ST} \cong \overline{YZ}$

$\angle T \cong \angle Z$ $\quad \overline{RT} \cong \overline{XZ}$



Question 3: A

Distribute the negative and drop the parentheses

$$7m - 3n - 4m - 6n$$

Combine Like Terms

$$7m - 4m - 3n - 6n$$

$$3m - 9n$$

Can check or solve by plugging in the concrete numbers for m and n

```
3→M
                    3
4→N
                    4
(7M-3N)-(4M+6N)
                  -27
3M-9N
                  -27
```

Question 4: J

Multiply coefficients and Add Exponents

$$4 \cdot 6x^{5+8} = 24x^{13}$$

Also can use concrete number for x

```
4→X
                    4
4X^5*6X^8
           1610612736
24X^13
           1610612736
```

Question 5: B

Plug as is into the calculator, or follow order of operaions like so

$$3|-3|-2(6)$$

$$3 \cdot 3 - 12$$

$$9 - 12$$

$$-3$$

```
3|3-6|-2(5+1)
                   -3
```

Question 6: K

Find the range using subtraction, but be careful of the negatives

Last − First

$$14 - (-5)$$

$$14 + 5$$

$$19°$$

Question 7: B

Find unique factors

$$35 \quad 28 \quad 8$$

$$5 \cdot 7 \quad 2^2 \cdot 7 \quad 2^2$$

$$2^3 \cdot 5 \cdot 7 = 280$$

You can also see which is the smallest answer choice evenly divisible by all 3.

```
lcm(35,lcm(28,8))
                  280
```

Question 8: J

$$3(-2)^2 - 6(-2) + 5$$

$$3 \cdot 4 + 12 - 5 = 12 + 7 = 19$$

```
-2→X
                   -2
3X^2-6X-5
                   19
```

Question 9: D

Mind the Gap!

First min = \$1.15

14 additional min (not 15)

\$1.15 + 14 (\$0.20) = \$3.95

Question 10: K

$an + b = F(n)$

Use elimination to solve the system of equations

$$\begin{array}{r} -16a + \cancel{b}\ 28 \\ 12a + \cancel{b} = 20 \\ \hline 4a = 8 \\ a = 2 \end{array}$$

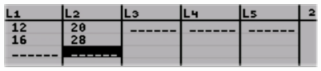
Now that we have "a" we can plug back in to either equation to solve for "b"

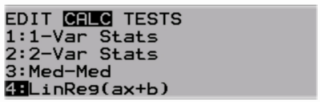
$12(2) + b = 20$

$16(2) + b = 28$

$b = -4$

$2n - 4 = F(n)$





Question 11: D

$65 + 40m = 515$

$40m = 450$

$m = 11.25$

Since she will be short after the 11 month, she must save for 12 months

Question 12: J

Area = length x width

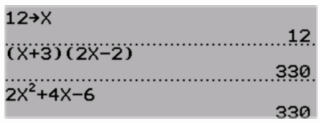
$(x+3)(2x-2)$

FOIL

$2x^2 - 2x + 6x - 6$

combine

$2x^2 + 4x - 6$



Question 13: D

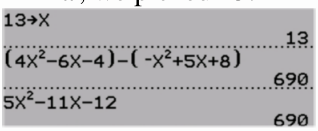
Same procedure as #4

$4x^2 - 6x - 4 + x^2 - 5x - 8$

$4x^2 + x^2 - 6x - 5x - 4 - 8$

$5x^2 - 11x - 12$

Or, substitute a number in for x, we picked 13:



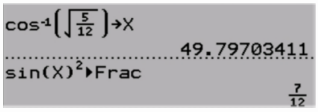
Question 14: G

$\sin^2 x + \cos^2 x = 1$

$\sin^2 x + \frac{5}{12} = 1$

$\sin^2 x = 1 - \frac{5}{12}$

$\sin^2 x = \frac{7}{12}$



Question 15: C

$180° - 108° = 72° = \angle BAC$

$180° - 140° = 40° = \angle BCA$

$\angle ABC + \angle BCA + \angle BAC = 180°$

$\angle ABC + 72° + 40° = 180°$

$\angle ABC = 68°$

Also, trust your eyes!

Question 16: F

In the standard form of a line $Ax + By = C$ the slope "m" $= -\frac{A}{B}$

$13x + 5y = 4$

$m = -\frac{13}{5}$

Question 17: D

Get to the sum total and work backwards

$76 + 82 + 94 + 90 + 78 = 420$

average

$\frac{420}{5} = 84$

# of tests

new average

$84 + 2 = 86$

$86 \cdot 6 = 516$

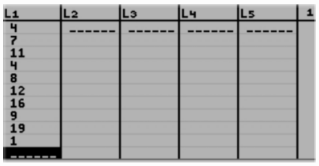
$516 - 420 = 96$

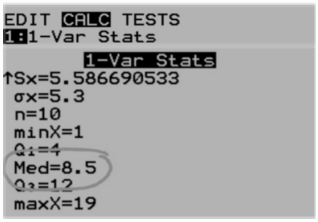
Question 18: G

Can put the numbers in order by hand

1, 4, 4, 7, 8, 9, 11, 12, 16, 19

$\frac{8+9}{2} = 8.5$





Question 19: D

If $a = 3$ (maximum)

$3 + b \geq 7$

$b \geq 4$

$b = 4$

Question 20: H

The savings to total expenses is equal to the angle out of 360°

$$\frac{450}{3200} = \frac{\theta}{360^\circ}$$

$$3200\theta = 162000$$
$$\theta = 50.625$$
$$\theta \approx 51^\circ$$

Question 21: B

You CAN use Pythagorean theorem to find the hypotenuse $\overline{AB}$, but the answer choices will dictate that $\overline{AB} = 25$

$$\sin A = \frac{opp}{hyp} = \frac{\overline{BC}}{\overline{AB}} = \frac{7}{25}$$

```
sin(tan⁻¹(7/24))▸Frac
                    7/25
```

Question 22: H

Area = base x height

base = 9 - 4 = 5
height = 6 - 0 = 6
5·6 = 30

Question 23: C

Plug in -5 for "x" and -3 for "y"

(-5+6 , -3 -4) = (1, -7)

Question 24: H

Use Elimination...

$$5(c + 2d = 16)$$
$$\cancel{5c} + 10d = 80$$
$$-(\cancel{5c} - 3d) = 15$$
$$\frac{\cancel{13}d}{\cancel{13}} = \frac{65}{13}$$
$$d = 5$$

Question 25: A

Area = $\frac{1}{2}$ base·height

base = $\overline{ZY}$ = 30
height = $\overline{WT}$ = 6
Area $\Delta WYZ = \frac{1}{2}(30)(6)$
Area $\Delta WYZ = 90 in^2$

Question 26: K

$$\text{sine} = \frac{\text{Opposite}}{\text{Hypotenuse}}$$

$$\text{cosecant} = \frac{\text{Hypotenuse}}{\text{Opposite}}$$

$$\frac{10}{6} = \frac{5}{3} = \csc Z$$

Must be J or K from the outset, as the larger number must be in the numerator

```
sin⁻¹(6/10)→Z
                    .64
1/sin(Z) ▸Frac
                    5/3
```

Question 27: E

Δ WZT is the 2nd multiple of the 3:4:5 Pythagorean triple, the 6:8:10, so $\overline{ZT}$ = 8 horizontally the x value of point X will be

$\overline{ZT} + \overline{WX}$ = 8 + 16 = 24

Question 28: H

By factoring (Grouping)

First factor out an x

$$x(2x^2 - 5x - 3)$$

split

$$x(2x^2 - 6x + x - 3)$$

$$x(2x(x-3) + 1(x-3))$$

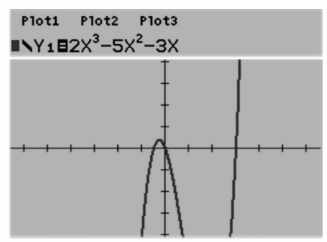
factor groups

$$x(2x+1)(x-3)$$

$2(-3) = -6$
$-6 + 1 = 5$
can be split in either order

Also, what makes the factor 0 will also make the polynomial 0

I = F(0) = 0 ✓
II = F(3) = 90 ✗
III = F(-½) = 0 ✓




```
TABLE SETUP
 TblStart=0
 ΔTbl=1
Indpnt: Auto Ask
Depend: Auto Ask
```

X	Y1
0.00	0.00
-3.00	-90.00
-.50	0.00

Question 29: C

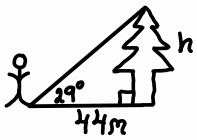
You can plug in each to get the temperatures and then subtract the results

$$F(28) - F(16) = 21\tfrac{3}{5}$$

but since it's a CHANGE, you can plug in the difference IF you ignore the constant

$$F = \tfrac{9}{5}(28 - 16) + \cancel{32} = 21\tfrac{3}{5}$$

Question 30: H



$$\text{Tan} = \frac{\text{opposite}}{\text{adjacent}}$$

$$\text{Tan}(29°) = \frac{h}{44m}$$

$$h = 44 \cdot \text{Tan}(29°)m$$

Question 31: C

$$(2+7i)x = 53$$

$$x = \frac{53}{2+7i} = 2-7i$$

If 2 complex numbers multiply to a real number, they MUST be conjugates or multiples of conjugates

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

$$2^2 + 7^2 = 53 = (2+7i)(2-7i)$$

```
53/(2+7i)
                    2.00-7.00i
```

Question 32: G

$A\sin(Bx)$ $|A|$ = Amplitude

$\frac{2\pi}{B}$ = Period $B = 5$

$\frac{2\pi}{5} = G$

From the graph, there are 2.5 cycles from 0 to π

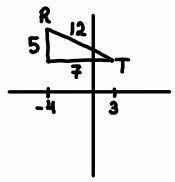
so $B = \frac{\pi}{2.5} = \frac{2\pi}{5}$

Question 33: C

$$\angle X + \angle Z = 180$$
$$\angle Y + \angle Z = 180$$
$$\angle X + \angle Z + \angle Y + \angle Z = 360$$
$$\underbrace{\angle X + \angle Y} + 2\angle Z = 360$$
$$90 + 2\angle Z = 360$$
$$2\angle Z = 270$$
$$\angle Z = 135$$

Can also be done by showing that $\angle X = \angle Y$

Question 34: J



Distance IS Pythagorean Theorem

$$\underbrace{\Delta y^2}_{|3-(-4)|=7} + \underbrace{\Delta x^2}_{|7-12|=5} = d^2$$

$$\sqrt{7^2+5^2} = \sqrt{74}$$

```
√(3--4)²+(7-12)²
                    8.60
√74
                    8.60
```

Question 35: C

From the plot, there are 11 students who sold more than 30 tickets

3	0 1 1 2 3 3 5 7 9	
4	1 2 3	

$\frac{11}{30}$

Question 36: G

$$\text{Sat} = 168(3) + 121(5)$$
$$= \$1109$$
$$\text{Sun} = 122(3) + 136(5)$$
$$= \$1046$$
$$1109 - 1046 = \$63$$

Sat > Sun by \$63

Question 37: C

Seats form an arithmetic sequence

$$a_n = a_1 + d(n-1)$$
$$s_n = 12 + 6(n-1)$$
$$s_n = 12 + 6(n-10)$$
$$s_n = 66 \text{ seats}$$

Question 38: K

The largest angle is across from the largest side. If $\measuredangle X$ is equal to 110°, then $\overline{YZ}$ is the longest side if the sides are in the relationship $\overline{YZ} > \overline{XZ} > \overline{ZY}$, the angles across will be the same.

$$\measuredangle X > \measuredangle Y > \measuredangle Z$$
$$\measuredangle X + \measuredangle Y + \measuredangle Z = 180$$
$$\measuredangle Y + \measuredangle \measuredangle = 70$$
$$\measuredangle Y < 70° \text{ and}$$
$$\measuredangle Z < 70°$$

Question 39: B

The definition of π is the ratio of the circumference of a circle to its diameter

$$\pi = \frac{\text{Circumference}}{\text{Diameter}}$$

$$\frac{\pi}{1} = \frac{80}{D} \qquad D = \frac{80}{\pi}$$

Can always swap diagnoal terms when 2 fractions are set equal to each other, and can always put contants over 1.

Question 40: J

Annual Interest Formula

$A_t = A_0(1+r)^t$

Monthly Interst Formula

$A_t = A_0\left(1+\frac{r}{12}\right)^{12t}$

$A_{12} = 3200\left(1+\frac{.05}{12}\right)^{12(12)}$

$= 3200\left(1+\frac{.05}{12}\right)^{144}$

Question 41: B

$\left(\sqrt{3x+4}\right)^2 = 4^2$

$3x+4=16$

$3x=12$

or

let $3x=y$

and solve for y

$\sqrt{y+4}+6=10$

You can also plug in answer choices for 3x, but don't confuse with 'x'

Question 42: H

Area of shaded region is Area of whole − Area of inner circle

$\pi R^2 - \pi r^2 = \text{Area}$

$\pi 12^2 - \pi 6^2 = \text{Area}$

$\pi 144 - \pi 36 = \text{Area}$

$108\pi = \text{Area}$

Question 43: A

Substitute 150 for 'P' and 2 for 'D', then solve for 'L'

$150 = \frac{25L}{2}$

Multiply by 2

$2(150) = 25L$

Divide by 25

$\frac{2(150)}{25} = L$

Question 44: J

$\frac{1}{12}+\frac{1}{2}+\frac{1}{3} = \frac{1}{12}+\frac{6}{12}+\frac{4}{12} = \frac{11}{12}$

The remaining $\frac{1}{12}$ are red

$\frac{1}{12} = \text{red total} = \frac{40}{x}$ $x=480$

There are 480 beads in the box. If half are green, then there are 240 greens.

Question 45: B

Can plug in concrete numbers and math with the right graph.

When x is 0, y is 2

When x is 4, y is 4

Or solve for y and match.

$3x-6y=-12$

subtract $-6y=-3x-12$

divide $y=\frac{1}{2}x+2$

Question 46: K

The length and width of the poster board will be the legs of a right triangle, with the diagonals being the hypotenuse. Since there are two diagonals

total length $= 2\sqrt{9^2+13^2}$

$= 2\sqrt{81+169}$

$= 2\sqrt{250}$

≈ 32 ft.

$2\sqrt{9^2+13^2}$

31.62

Question 47: A

Circumference $= 2\pi r$

$2(20)\pi = 40\pi$

$\frac{40\pi}{6} = \frac{20\pi}{3}$

Question 48: K

What Paco did...

$B_0 + \$40 = B_n$

What Paco should've done...

$B_0 - \$40 = B_n$

Say he started with \$100,

it now reads \$140,

but it should read \$60,

So it now reads \$80 (140−60) more than it should.

Question 49: A

Vertical asymptote is where the denominator is equal to 0

$2x+6=0$

$2x=-6$

$x=-3$

Question 50: K

We have 6 repeating digits, so $\frac{999}{6}=166\frac{3}{6}$ cycles. Since the remainder is 3, the 999th digit must be the 3rd digit in the repeating sequence, which is '8'.

Question 51: E

You can use concrete numbers here, but $r_w = 8r_x$

and $h_w = \frac{h_x}{8}$

$V_x = \frac{1}{3}\pi r_x^2 h_x$

$V_w = \frac{1}{3}\pi (8r)^2\left(\frac{h_x}{8}\right)$

$\frac{V_w}{} = \frac{\frac{\cancel{\frac{1}{3}}\cancel{\pi}\cancel{8}\cdot 8\,\cancel{r_x^2}\cancel{h_x}}{\cancel{8}}}{\cancel{\frac{1}{3}}\cancel{\pi}\cancel{r_x^2}\cancel{h_x}} = 8$

V_w is 8 times as great as V_x

Question 52: K

If x is odd and negative, then 3x is also odd and negative, so for $3xy^5$ to be even and positive, y^5 must be even, since an odd must be multiplied by and even to get an even result, and y^5 must be negative, as a negative times a negative is a positive. Since odd exponents keep their sign, 'y' must be negative and even.

```
-7→X
                    -7.00
-4→Y
                    -4.00
3XY^5
                 21504.00
```

Question 53: E

Use Pythagorean theorem to find the height of the cylinder $h^2 + 14^2 = (2\sqrt{193})^2$

$h^2 + 196 = 772$

$h^2 = 576$

$h = 24$

Volume $= \pi r^2 h$

$= \pi (14)^2 (24)$

$= 4704\pi$

$\approx 14{,}778$

```
14→R
                    14.00
√((2√193)^2-R^2)→H
                    24.00
πR^2H
                 14778.05
```

Question 54: K

Since the first and last digit are always 7, we only have 1 option for each of those digits. For The other 7, there are 10 options, so the total number of possible pins

$= \underline{1} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{1}$

$= 10^7$

Question 55: C

In Law of Sines, the proportion of the side length to the sine of the angle across is the same for all 3 side,

so $\dfrac{\sin 40}{d_{y-o}} = \dfrac{\sin 80}{1400}$

$d_{y-o} = \dfrac{1400 \sin 40}{\sin 80}$

Question 56: F

$3\cos r = 3$ $\quad 3\sin(\pi + t) = 3$

$\cos r = 1$ $\quad \sin(\pi + t) = 1$

$\cos^{-1}(1) = r$ $\quad \sin^{-1}(1) = \pi + t$

$0 = r$ $\quad \frac{\pi}{2} = \pi + t$

$r + t = -\frac{\pi}{2}$ $\quad -\frac{\pi}{2} = t$

```
NORMAL FIX2 DEC REAL RADIAN MP
cos⁻¹(1)→R
                     0.00
sin⁻¹(1)-π→T
                    -1.57
(R+T)/π▸Frac
                     -1/2
```

Question 57: E

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} ax + by \\ cx + dy \end{bmatrix}$$

$$\begin{bmatrix} 6 & -1 \\ 4 & -2 \end{bmatrix} \begin{bmatrix} 3 \\ -4 \end{bmatrix} = \begin{bmatrix} 6(3) + -1(-4) \\ 4(3) + -2(-4) \end{bmatrix}$$

$$= \begin{bmatrix} 22 \\ 20 \end{bmatrix}$$

$A \times B \cdot B \times C$

$(2 \times 2)(2 \times 1) = (2 \times 1)$

$A \times C$

```
Row Col
 1   1
 2   2
 3   3
 4   4
 5   5
 6   6
OK
FRAC FUNC MTRX YVAR
```

```
[6  -1][3 ]
[4  -2][-4]
                [22.00]
                [20.00]
```

Question 58: H

x-axis reflection

① $F(x) = -F(x)$

Vertical shift

② $F(x) = F(x) + Y$

Horizontal shift

③ $F(x) = F(x - h)$

$y = \cos x$

$y = \underset{①}{-}\cos(x - \underset{②}{1.5\pi}) \underset{②}{-b}$

Question 59: C

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

center $(h, k) = (5, 4)$

Major Axis $a = 3$

minor axis $b = 2$

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

$$\frac{(x-5)^2}{9} + \frac{(y-4)^2}{4} = 1$$

Question 60: H

$\log_{(x+2)}(x^2 + 6) = 2$

$(x+2)^2 = x^2 + 6$

$\cancel{x^2} + 4x + 4 = \cancel{x^2} + 6$

$4x = 2$

$x = \frac{1}{2}$

```
Plot1
\Y1=  1:abs(
      2:summation Σ(
      3:nDeriv(
\Y2=  4:fnInt(
\Y3=  5:logBASE(
\Y4=  6:x√
\Y5=  7:nPr
\Y6=  8:nCr
\Y7=  9:!
FRAC FUNC MTRX YVAR
Plot1 Plot2 Plot3
\Y1=log_{x+2}(x^2+6)
```

X	Y1
-2.00	ERROR
-1.00	ERROR
.50	2.00
2.00	1.66

12.2 Practice Test 2 Explanations

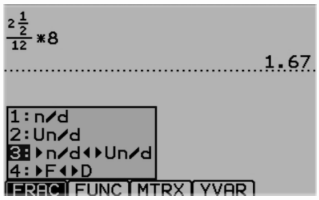
Question 1: D

CROSS MULTIPLY

$$\frac{2.5}{12} = \frac{X}{8}$$

$$12X = 20$$

$$X = \frac{20}{12} = \frac{5}{3} = 1\frac{2}{3}$$



Question 2: K

TOTAL JUNIORS = 10

9 OTHER JUNIORS

TOP JUNIOR PROBABILITY $= \frac{1}{10}$

$$\frac{1}{10} \times \frac{1}{3} = \frac{1}{30}$$

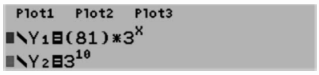
CHANCE OF ANY JUNIOR

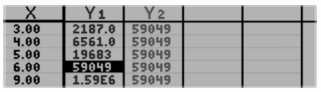
Question 3: D

$$81 = 3^4$$

$$3^4 \cdot 3^X = 3^{10}$$

$$4 + X = 10 \rightarrow X = 6$$





X	Y1	Y2
3.00	2187.0	59049
4.00	6561.0	59049
5.00	19683	59049
6.00	59049	59049
9.00	1.59E6	59049

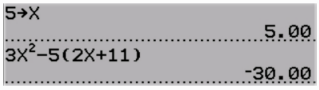
Question 4: G

$$3(5^2) - 5(2(5) + 11)$$

$$3 \cdot 25 - 5(10 + 11)$$

$$75 - 5(21)$$

$$75 - 105 = -31$$



Question 5: D

$$3.50 + 0.75m > 10.99$$

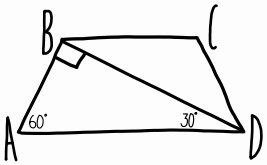
$$0.75m > 7.49$$

$$m > 9.99 \approx 10$$

Question 6: G

$$\frac{\text{FAVORABLE}}{\text{ALL POSSIBLE}} = \frac{12}{20} = \frac{3}{5}$$

Question 7: D



$$\angle A + \angle ADB + \angle ABD = 180^\circ$$

$$2X + X + 90^\circ = 180^\circ$$

$$3X = 90^\circ$$

$$X = 30^\circ \rightarrow 2X = 60^\circ$$

IN AN ISOSCELES TRAPEZOID, OPPOSITE ANGLES = SUPPLEMENTARY:

$$\angle A + \angle C = 180^\circ$$

$$60^\circ + \angle C = 180^\circ$$

$$\angle C = 120^\circ$$

Question 8: G

MATCH COEFFICIENTS (INCLUDING SIGNS):

$$\begin{matrix} 1X + 3Y = 12 \\ 7X + (-1Y) = 1 \end{matrix} \longrightarrow \left[\begin{array}{cc|c} 1 & 3 & 12 \\ 7 & -1 & 1 \end{array}\right]$$

Question 9: B

MIDPOINT OF A DIAMETER IS THE CIRCLE CENTER → USE AVERAGE OF COORDINATES

$$\left(\frac{5 + (-10)}{2}, \frac{-8 + 12}{2}\right) = (-2.5, 2)$$

Question 10: G

SYSTEM OF EQUATION

$\$15 + \$12 + \$2b + \$5p = \$68$

$\$2b + \$5p = 41$

$b + p = 13$

3-STEP HACK

1 ASSUME ALL 13 WERE BASIC
$\$2 \cdot 13 = \$26$

2 ALL RIDES ACTUALLY COST $41
$\$41 - \$26 = \$15$

3 DIFFERENCE MUST BE PREMIUM RIDES
$5 - 2 = \$3$ A RIDE $\rightarrow \frac{\$15}{\$3} = 5$ PREMIUM RIDES

Question 11: E

LET X = NUMBER OF TESTS $\begin{matrix}1\\3\\1\end{matrix}$

$X - 2 \longrightarrow$ TESTS SCORING 90

$$\frac{98 + 98 + 90(X-2)}{X} = 92$$

$$196 + 90X - 180 = 92X$$

$$16 = 2X$$

$$8 = X$$

Question 12: K

$2l + 2w = 34$

$l + w = 17$

$l + w > d$

$d < 17 \rightarrow$ ONE ANSWER

OR SET-UP A SYSTEM OF EQUATIONS

$l \cdot w = 60$

$w = 17 - l$

$l(17 - l) = 60$

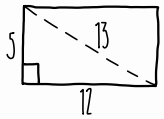
$17l - l^2 = 60$

$l^2 - 17l + 60 = 0$

$(l-12)(l-5)$

$l = 12 \rightarrow w = 5$

OR $l = 5 \rightarrow w = 12$



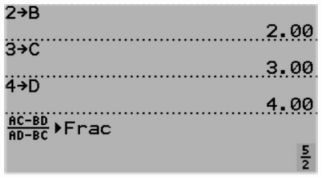
Question 13: B

$500 - 20 = \$480$ LEFT FOR THE TEAM

FOR THE OTHER MEMBERS: $\frac{\$320}{4} = \$80$

Question 14: J

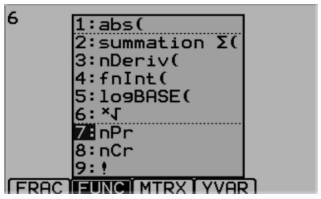
$$\frac{1(3) - 2(4)}{1(4) - 2(3)} = \frac{3-8}{4-6} = \frac{-5}{-2} = \frac{5}{2}$$



Question 15: E

NO REPITION MEANS PERMUTATIONS/FACTORIALS

$6!$ OR ${}_6P_6 = 720$

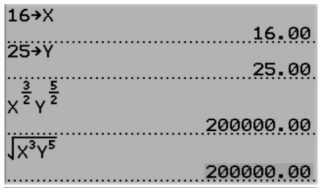


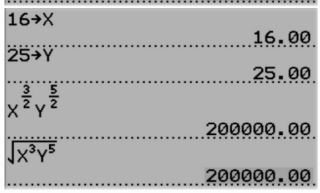
Question 16: K

$$C^{a/b} = \sqrt[b]{C^a}$$

$$X^{3/2} = \sqrt{X^3} \quad \begin{matrix}1\\3\\1\end{matrix} \quad Y^{5/2} = \sqrt{Y^5}$$

$$\sqrt{X^3} \cdot \sqrt{Y^5} = \sqrt{X^3 Y^5}$$





Question 17: A

$3X + 5Y = 10$

$5Y = -3X + 10$

$Y = \frac{-3}{5}X + 2$

$m = \frac{-3}{5}, b = 2$

$m_\perp = \frac{5}{3} \rightarrow Y = \frac{5}{3}X + 2$

Question 18: K

AVERAGED WITH → DIVIDED SUM = SMALLER VALUE

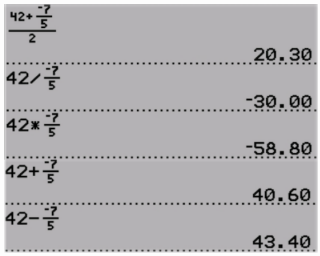
DIVIDED BY → YIELD NEGATIVE VALUE

MULTIPLIED BY → YIELD NEGATIVE VALUE

PLUS → YIELD SMALLER VALUE

MINUS → SUBTRACTING A NEGATIVE = ADDITION

$$42 - \left(\frac{-7}{5}\right) = 42 + \left(\frac{7}{5}\right) = 43\frac{2}{5}$$



Question 19: C

$$\overline{AB}^2 + \overline{AC}^2 = \overline{BC}^2$$
$$18^2 + 24^2 = \overline{BC}^2$$
$$\sqrt{900} = \overline{BC}$$
$$30 = \overline{BC}$$

SIXTH MULTIPLE OF THE 3-4-5 TRIPLE

$$6 \cdot (3:4:5) = 18:24:30$$

IF $\overline{BC} = 30$ AND ITS MIDPOINT IS EQUIDISTANT FROM $\angle A$, $\angle B$, $\frac{1}{3}\angle C$

$$\frac{30}{2} = 15 \text{ UNITS}$$

Question 20: K

$$\frac{1/4}{20} = \frac{6\,3/4}{X}$$

CROSS MULTIPLY

$$\frac{X}{4} = 135$$
$$X = 540$$

Question 21: C

THREE DIGIT NUMBER = 100

$$S_n = \frac{n(a_1 + a_n)}{2} \qquad a_1 = 1$$

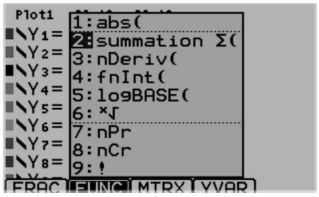
HERE $a_n = n$ BECAUSE $d = 1$

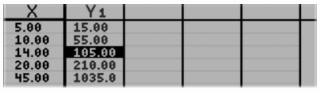
$$100 = \frac{n(1 + a_n)}{2}$$
$$200 = n + n^2$$
$$n^2 + n - 200 = 0$$
$$= \frac{-1 \pm \sqrt{1^2 - 4(1)(200)}}{2} = \frac{-1 \pm \sqrt{1 + 800}}{2}$$

ANSWER MUST BE POSITIVE

$$= \frac{-1 \pm \sqrt{801}}{2} = \frac{-1 + 28.302}{2}$$

$n = 13.65 \longrightarrow 14$ IS CLOSEST



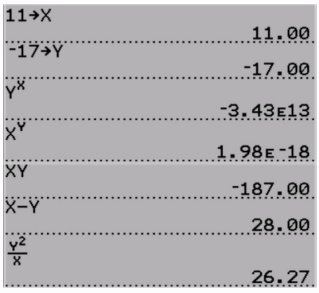


X	Y1
5.00	15.00
10.00	55.00
14.00	105.00
20.00	210.00
45.00	1035.0

Question 22: J

$X = +$ ODD INTEGER $\longrightarrow$ LIKE $+5$
$Y = -$ ODD INTEGER $\longrightarrow$ LIKE -3

F. $Y^X = (-3)^5 = -243$ ⊖ ODD INTEGER
G. $X^Y = 5^{-3} = \frac{1}{125}$ NOT AN INTEGER
H. $XY = (5)(-3) = -15$ ⊖ ODD INTEGER
J. $5 - (-3) = 8$ ⊕ EVEN INTEGER
K. $\frac{Y^2}{X} = \frac{(-3)^2}{5} = \frac{9}{5} = 1.8$ NOT AN INTEGER



Question 23: D

$$\text{AREA} = \tfrac{1}{2}(\text{BASE})(\text{HEIGHT})$$
$$= \tfrac{1}{2}(9 - (-5))(12 - 0)$$
$$= \tfrac{1}{2}(14)(12) = 84$$

Question 24: J

$$\overline{AC} = 9 - (-5) = 14$$
$$\overline{BC} = \sqrt{(-5)^2 + 12^2} = 13$$
$$\overline{AB} = \sqrt{9^2 + 12^2} = 15$$
$$14 + 13 + 15 = 42$$

Question 25: A

$$\tan(A) = \frac{12}{9} \quad \tan(C) = \frac{12}{5}$$
$$\tan(A)\tan(C) = \frac{12}{9} \cdot \frac{12}{5} = \frac{144}{45} = \frac{16}{5}$$

Question 26: F

$$|m\overline{AC}| = 0 \quad |m\overline{BC}| = \frac{12}{5} \quad |m\overline{AB}| = \frac{-12}{9}$$
$$\overline{AC} < \overline{AB} < \overline{BC}$$

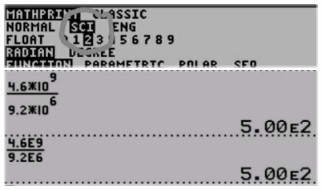
Question 27: D

$$X = 0,\ Y = 0$$
$$(0-3)^2 + (0-4)^2$$
$$(-3)^2 + (-4)^2 = 9 + 16 = 25$$

Question 28: G

$$\frac{4.6\times10^9}{9.2\times10^6} \rightarrow \frac{4.6}{9.2}\times\frac{10^9}{10^6} = 0.5\times10^3$$

$$0.5\times10^3 \rightarrow 5.0\times10^2$$



Question 29: A

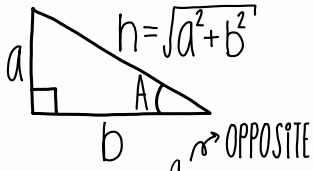
$$V=\pi r^2 h$$

$$d=8 \rightarrow r=4$$

$$h=3r \rightarrow 3\cdot4=12$$

$$V=\pi 4^2\cdot12=192\pi$$

Question 30: G

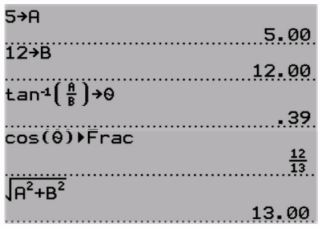


$$h=\sqrt{a^2+b^2}$$

$$\tan A = \frac{a}{\sqrt{a^2+b^2}}$$

a → OPPOSITE

$\sqrt{a^2+b^2}$ → HYPOTENUSE



Question 31: A

USE QUADRATIC EQUATION

$$X=\frac{-0\pm\sqrt{0^2-4(1)(64)}}{2(1)}$$

$$X=\pm\frac{\sqrt{-256}}{2}=\pm\frac{16i}{2}$$

$$X=\pm8i \rightarrow X+8i \quad X-8i$$

Question 32: H

$$P_{OUTSIDE}=1.17\times P_{INSIDE}$$

$$34\text{ IN}=1.17\times P_{INSIDE}$$

$$P_{INSIDE}=\frac{34}{1.17}=29\text{ IN}$$

Question 33: D

$$V_{1\text{-BALL}}=\frac{4}{3}\pi r^3$$

$$d=2\tfrac{1}{4}\text{ IN}=2r$$

$$r=1\tfrac{1}{8}\text{ IN}$$

$$V_{1\text{-BALL}}=\frac{4}{3}\pi\left(1\tfrac{1}{8}\right)^3=5.96\text{ IN}^3$$

$$\text{TOTAL VOLUME}=9\cdot5.96\text{ IN}^3=53.7\text{ IN}^3$$

Question 34: G

$$5\tfrac{1}{16}\cdot1.11=17.65\text{ IN}$$

$$A=4\pi r^2=17.65\text{ IN}^2$$

$$r=\sqrt{\frac{17.65}{4\pi}}\approx1.185$$

$$d=2r=2\cdot1.185=2.37\text{ IN}$$

Question 35: C

COUNTING PRINCIPLE

11 BOYS × 14 GIRLS = 154 COMBINATIONS

Question 36: K

INDEPENDENT EVENTS

$$P(\text{JUDGE})=\frac{3}{14}$$

$$P(\text{TWICE})=\frac{3}{14}\cdot\frac{3}{14}=\frac{9}{196}$$

Question 37: A

P(2 BOYS) = 2 BOYS OUT OF 11 = ${}_{11}C_2$

P(3 GIRLS) = 3 GIRLS OUT OF 14 = ${}_{14}C_3$

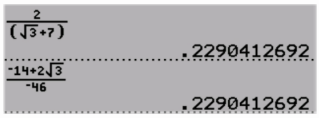
ALL POSSIBLE OUTCOMES = 5 STUDENTS OUT OF 25 = ${}_{25}C_5$

$$\frac{P(2\text{ BOYS})\cdot P(3\text{ GIRLS})}{\text{ALL POSSIBLE OUTCOMES}}=\frac{({}_{11}C_2)\cdot({}_{14}C_3)}{{}_{25}C_5}$$

Question 38: J

MULTIPLY BY CONJUGATE

$$\frac{2}{(\sqrt{3}+7)}\cdot\frac{(\sqrt{3}-7)}{(\sqrt{3}-7)}=\frac{-14+2\sqrt{3}}{3-49}=\frac{-14+2\sqrt{3}}{-46}$$



Question 39: C

IF $AX+BY=C$ AND $DX+EY=F$ HAS NO SOLUTION, THEN

$$\frac{A}{D}=\frac{B}{E}\neq\frac{C}{F}$$

$$\frac{10}{15}\times\frac{7}{D}$$ CROSS MULTIPLY

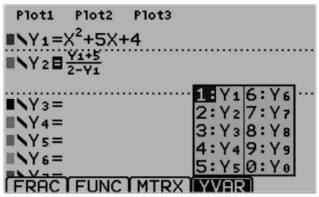
$$10D=105 \rightarrow D=10.5$$

Question 40: F

$$f(g(-3)) = \frac{g(-3)+5}{2-g(-3)}$$

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

$$f(g(-3)) = \frac{-2+5}{2-(-2)} = \frac{3}{4}$$



Question 41: D

DIRECT = NUMERATOR
INVERSE = DENOMINATOR
K = CONSTANT

$$\frac{KV^2}{a}$$

Question 42: H

NUMBER DATA POINTS
$n = 14$

MEDIAN = AVERAGE OF 7TH AND 8TH POSITIONS
7TH POSITION = 64 8TH POSITION = Y

$$\frac{64+Y}{2} = 65$$

$$Y = (65 \cdot 2) - 64$$
$$Y = 130 - 64$$
$$Y = 66$$

Question 43: B

$$40 \cdot 0.75 \cdot 3 = 90$$
$$30 \cdot 0.6 \cdot 2 = 36$$
$$30 \cdot 0.5 \cdot 1 = 15$$
$$90 + 36 + 15 = 141$$

Question 44: H

TRIANGLE INEQUALITY THEOREM

$$A + B > C$$
$$10 - 4 < KL < 10 + 4$$
$$6 < KL < 14$$

FOR AN OBTUSE TRIANGLE

$$A^2 + B^2 < C^2$$

$4^2 + (KL)^2 < 10^2$ OR $4^2 + 10^2 < (KL)^2$

$KL < \sqrt{84}$ $KL > \sqrt{116}$

7, 8, 9 11, 12, 13

{7, 8, 9, 11, 12, 13}

Question 45: D

$SA_{LEFT} = 16$ (8 VISIBLE, 8 HIDDEN)

$SA_{RIGHT} = 18$ (9 VISIBLE, 9 HIDDEN)

$$\Delta SA = 18 - 16 = 2$$

$$\frac{\Delta SA}{\text{ORIGINAL SA}} = \frac{2}{16} \times 100\% = 12.5\%$$

Question 46: K

$1 FT^3 = (12 IN)^3 = (12^3) IN^3 = 1728 IN^3$

$$\text{BOWLING BALL} = 320 IN^3 \times \frac{1 FT^3}{1728 IN^3} = 0.185 FT^3$$

24 BOWLING BALLS $= 24 \times 0.185 FT^3 = 4.44 FT^3$

CRATE $= 3FT \times 2.5FT \times 2.5FT = 18.75 FT^3$

$18.75 FT^3 - 4.44 FT^3 \approx 14.3 FT^3$ OF WATER COULD FIT BEFORE OVERFLOWING

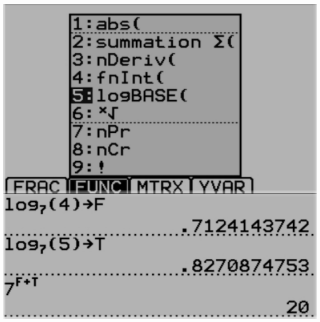
Question 47: A

LOG ROLL

EQUALS $\log_7 4 = F$ $7^F = 4$ EQUALS $\log_7 5 = T$ $7^T = 5$

TO THE TO THE

$$4 \times 5 = 20 \rightarrow 7^F \times 7^T = 20 \rightarrow 7^{F+T} = 20$$



Question 48: J

$$a_n = a_1 \times r^{(n-1)}$$

$n=5$ $\quad r = \frac{800\,000}{1000\,000} = 0.8$

$a_1 = 1000\,000$

$$a_5 = 1000\,000 \times (0.8)^{5-1}$$
$$a_5 = 1000\,000 \times (0.8)^4$$
$$a_5 = \$409\,600$$

L1	L2	L3	L4	L5
1	1E6	------	------	------
2	800000			
------	------			

L2(1)=1000000

```
EDIT CALC TESTS
2↑2-Var Stats
3:Med-Med
4:LinReg(ax+b)
5:QuadReg
6:CubicReg
7:QuartReg
8:LinReg(a+bx)
9:LnReg
0↓ExpReg
```

```
ExpReg
Xlist:L1
Ylist:L2
FreqList:
Store RegEQ:Y1
Calculate
```

```
ExpReg
y=a*b^x
a=1250000
b=.8
r²=1
r=-1
```

```
Plot1  Plot2  Plot3
\Y1=1250000*.8^X
```

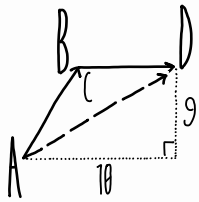
X	Y1
1	1E6
2	800000
3	640000
4	512000
5	409600

```
                1000000
Ans*.8
                 800000
Ans*.8
                 640000
Ans*.8
                 512000
Ans*.8
                 409600
```

Question 49: D

$$\overrightarrow{AB} = 3i + 10j$$
$$\overrightarrow{CD} = \frac{6i + 0j}{9i + 10j}$$

Question 50: G



$$\sqrt{10^2 + 9^2} = \sqrt{181}$$

Question 51: A

$$3\langle 3+10\rangle + \ominus 2\langle 6,0\rangle + W = 0$$
$$\langle 9+30\rangle + \langle \ominus 12, 0\rangle + W = 0$$
$$\langle -3, 30\rangle + W = 0$$
$$W = \langle 3, -30\rangle$$

Question 52: F

$b^2 - 4ac$

DISCRIMINANT = $\ominus$ FOR IMAGINARY ROOTS

$$F(x) = 3x^2 + bx + 7$$
$$b^2 - 4(3)(7) < 0$$
$$b^2 - 84 < 0$$
$$b^2 < 84 \longrightarrow |b| < \sqrt{84}$$

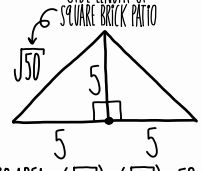
SQUARE ROOT OF AN INEQUALITY YIELDS AN ABSOLUTE VALUE

Question 53: B

$$\text{RADIUS} = \frac{\text{DIAMETER}}{2} = \frac{10}{2} = 5$$

$$\text{PAVILLION AREA} = \pi(5)^2 = 25\ dm^2$$

SIDE LENGTH OF SQUARE BRICK PATIO



$$\text{PATIO AREA} = (\sqrt{50}) \cdot (\sqrt{50}) = 50\ dm^2$$
$$\text{POTTING AREA} = 25\pi - 50 = 29.5 \rightarrow 29 \text{ BARRELS}$$

Question 54: H

$$F(g(x)) = 3(5x+b) - 7$$
$$g(F(x)) = 5(3x-7) + b$$
$$F(g(x)) = g(F(x))$$
$$3(5x+b) - 7 = 5(3x-7) + b$$
$$\cancel{15x} + 3b - 7 = \cancel{15x} - 35 + b$$
$$3b - 7 = -35 + b$$
$$2b = -28 \longrightarrow b = -14$$

Question 55: C

$$\text{PERIOD} = \frac{2\pi}{B}$$ TRUE FOR SIN, COS, SEC AND CSC

$$F(x) = A\sec(Bx - C) + D$$ HERE $B=2$

$$\text{PERIOD} = \frac{2\pi}{2} = \pi$$

Question 56: K

$$\text{EXPECTED VALUE} = \frac{\text{TOTAL AMOUNT OF MONEY}}{\text{NUMBER OF BILLS}}$$

TOTAL AMOUNT OF MONEY $= 1(12) + 5(7) + 10(5) + 20(3) = \$157$

NUMBER OF BILLS $= 12 + 7 + 5 + 3 = 27$ BILLS

$$\text{EXPECTED VALUE} = \frac{\text{TOTAL AMOUNT OF MONEY}}{\text{NUMBER OF BILLS}} = \frac{\$157}{27 \text{ BILLS}}$$

L1	L2	L3	L4	L5	3
1	12	------	------	------	
5	7				
10	5				
20	3				
------	------				

```
1-Var Stats
List:L1
FreqList:L2
Calculate
```

```
1-Var Stats
x̄=5.81
Σx=157.00
Σx²=1887.00
Sx=6.12
σx=6.01
n=27.00
```

Question 57: C

USE THE MODULUS

$(-2+7i)-(6+i)=(-2-6)+(7i-i)$

$d=|(-2-6)+(7i-i)|=\sqrt{(-8)^2+(6)^2}$

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

```
|(-2+7i)-(6+i)|
                10
```

Question 58: H

$\det\begin{vmatrix}(X+2) & 10\\ 2 & (X-5)\end{vmatrix}=(X+2)(X-5)-(2)(10)=10$

$(X^2+2X-5X-10)-20=10$

$X^2-3X-40=0$

$(X-8)(X+5)=0 \longrightarrow X=-5 \text{ OR } 8$

```
NAMES MATH EDIT
1:det(
```

```
Plot1  Plot2  Plot3
Y1=det(
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

Row	Col
1	1
2	2
3	3
4	4
5	5
6	6

OK

FRAC FUNC MTRX YVAR

```
Plot1  Plot2  Plot3
Y1=det([[X+2  10]
        [2    X-5]])
```

X	Y1
-2	-20
5	-20
6.217	-10
-3.217	-10
-5	10
8	10
7.1789	0
-4.179	0
-8	58
5	-20

Question 59: C

$\tan^2\theta=1 \longrightarrow \tan\theta=\pm\sqrt{1}$

$\tan^{-1}(+1)=\frac{\pi}{4}$ $\quad$ $\tan^{-1}(-1)=-\frac{\pi}{4}$

CALCULATOR MAY READ 45° AND -45°

$\frac{\pi}{4}=\frac{180°}{4}=45°$

X	Y1
0	0
.7854	1
-.7854	1
1.5708	ERROR
-1.571	ERROR

X=-π/4

Question 60: K

ATLEAST 1 ERROR IS NOT 0 ERRORS

$P(\text{NOT } 0)=1-P(0)=1-0.0724=0.9276$