57) Point-slope form: $y - y_1 = m(x - x_1)$

where (x_1, y_1) is any point on the line

and $m = \frac{y_2 - y_1}{x_2 - x_1}$ is the slope.

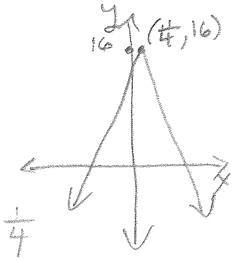
$\underset{x_1\ \ y_1}{(7, -6)}$ $\underset{x_2\ \ y_2}{(-10, 15)}$ $m = \frac{15 - (-6)}{-10 - 7} = \frac{21}{-17}$

$y - (-6) = -\frac{21}{17}(x - 7)$ or $y - 15 = -\frac{21}{17}(x - (-10))$

$y + 6 = -\frac{21}{17}(x - 7)$ $y - 15 = -\frac{21}{17}(x + 10)$

58) $y = -2\underbrace{|4x - 1|}_{} + 16$ PF: $f(x) = |x|$

set = 0 to find
shift: $4x - 1 = 0$
$4x = 1$
$x = \frac{1}{4}$ ⟸ shifts right $\frac{1}{4}$



Shifts up 16
opens down, narrower

(Note: other answer key is wrong.)

59) Parallel lines have same slope, different y-intercept

Perpendicular lines have opposite-reciprocal slopes

L_1: $m_1 = \frac{-5 - 7}{-3 - 1} = \frac{-12}{-4} = 3$

same slope.

L_2: $m_2 = \frac{-2 - (-20)}{0 - (-6)} = \frac{18}{6} = 3$

$L_1 = y - 7 = 3(x - 1) \Rightarrow y - 7 = 3x - 3$
$\quad +7 \quad\quad +7$
$y = 3x + 4$

L_2: $y - (-2) = 3(x - 0) \Rightarrow y + 2 = 3x \Rightarrow y = 3x - 2$

Lines are parallel; same slope, different y-intercept

60) $\left(\frac{16}{81}\right)^{-\frac{3}{4}}$ Recall $\left(\frac{a}{b}\right)^{-n}=\left(\frac{b}{a}\right)^{n}$

$\left(\frac{81}{16}\right)^{\frac{3}{4}}$

$\frac{81^{\frac{3}{4}}}{16^{\frac{3}{4}}} \Rightarrow \frac{(\sqrt[4]{81})^3}{(\sqrt[4]{16})^3} \Rightarrow \frac{3^3}{2^3} \Rightarrow \frac{27}{8}$

61) $\ln \sqrt[4]{\frac{x^2 z}{y^3}}$ Recall $\sqrt[m]{x^n}=x^{\frac{n}{m}}$

$\ln\left(\frac{x^2 z}{y^3}\right)^{\frac{1}{4}} \Rightarrow \frac{1}{4}\ln\left(\frac{x^2 z}{y^3}\right) \Rightarrow \frac{1}{4}\left(\ln x^2+\ln z-\ln y^3\right) \Rightarrow$

$\frac{1}{4}\left(2\ln x+\ln z-3\ln y\right) \Rightarrow \frac{1}{2}\ln x+\frac{1}{4}\ln z-\frac{3}{4}\ln y$

62) a) $\log_8 92+\log_5 12-\ln 6$ (use calculator)

if no TInspire: $\frac{\log 92}{\log 8}+\frac{\log 12}{\log 5}-\ln 6 \approx 1.92672$

b) $e^{-0.417} \approx .659021$

63) $a_1=-5$ $a_n=-2a_{n-1}+n$ Recursive sequence; use result in next term.

$a_1=-5$
$a_2=-2(a_1)+2=-2(-5)+2=10+2=12$
$a_3=-2(a_2)+3=-2(12)+3=-24+3=-21$
$a_4=-2(a_3)+4=-2(-21)+4=42+4=46$
$a_5=-2(a_4)+5=-2(46)+5=-92+5=-87$

64) $\sum_{n=1}^{40}\left(\frac{4}{3}n+\frac{2}{3}\right)$ Recognize the arithmetic form (linear in n) Use formula $S_n=\frac{n}{2}(a_1+a_n)$ for $n=40$

$a_1=\frac{4}{3}(1)+\frac{2}{3}=\frac{6}{3}=2$

$a_{40}=\frac{4}{3}(40)+\frac{2}{3}=\frac{160}{3}+\frac{2}{3}=\frac{162}{3}=54$

$S_{40}=\frac{40}{2}(2+54)=20(56)=1120$

65) $(5x+4)(x^2-1)-3(2-x^2)$ Distribute & combine like terms

$5x^3-5x+4x^2-4-6+3x^2$

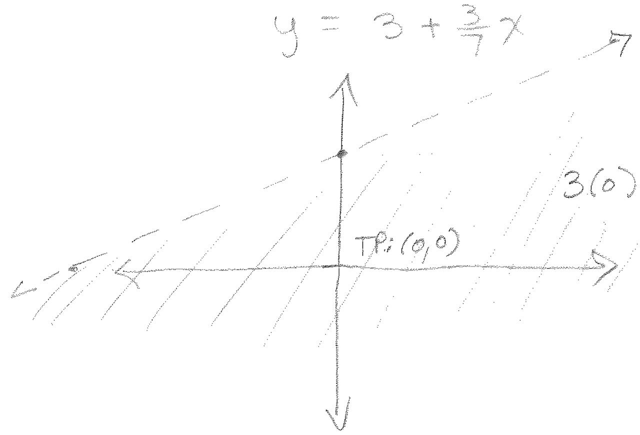
$5x^3+7x^2-5x-10$

66) $3x-7y>-21$ Solve for y and sketch the line with a <u>dashed line</u>.

$3x-7y=-21$ then pick a test point to choose which side of the line to shade.

$-7y=-21-3x$

$y=3+\frac{3}{7}x$



$3(0)-7(0)>-21$

$0>-21$ True; so shade the side with the test point (0,0)

67) $5.1x^2-0.33x-0.1=y$ graph & find the zero.

Calculator skill. Find maximum for vertex coordinates. Domain of any polynomial function is all real numbers. Range depends on vertex.

68) $f(x)=x^2+1$ $g(x)=2x-3$

$h(x)=g(x)-f(x)=2x-3-(x^2+1)$

$=2x-3-x^2-1=-x^2+2x-4$

$h(x)=f(g(x))=f(2x-3)=(2x-3)^2+1$

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

$=4x^2-12x+9+1=4x^2-12x+10$

69) $\dfrac{x-3}{2x^2-17x+21} \div \dfrac{x^2-x-6}{x-7}$

Division is multiplication of the reciprocal. Factor all parts & rewrite as multiplication.

↑

to factor:

$2x^2$	
	21

$2(21)=42$

Need two x terms with coefficients that multiply to 42 and add to -17

-3 & -14

Fill in boxes & factor (like Punnett square)

	$2x$	-3
x	$2x^2$	$-3x$
-7	$-14x$	21

Factors are $(x-7)(2x-3)$

$$\frac{\cancel{(x-3)}}{\cancel{(x-7)}(2x-3)} \cdot \frac{\cancel{(x-7)}}{\cancel{(x-3)}(x+2)}$$

Divide out common factors & then multiply across

$$\frac{1}{(2x-3)(x+2)}$$

70) n^{th} term form of a geometric sequence is $a_n = a_1 r^{n-1}$

$a_1 = 4$, $r = \frac{1}{2}$, $a_n = 4\left(\frac{1}{2}\right)^{n-1}$

$$a_{10} = 4\left(\tfrac{1}{2}\right)^{10-1} = 4\left(\tfrac{1}{2}\right)^9 = \frac{4}{2^9} = \frac{1}{2^7}$$

$$= \frac{1}{128}$$

71) Remainder theorem is synthetic substitution.

$$\begin{array}{r|rrrr} -4 & 2 & -3 & 1 & 1 \\ & & -8 & 44 & -180 \\ \hline & 2 & -11 & 45 & \boxed{-179} \end{array} \quad f(-4) = -179$$

Represents an ordered pair $(-4, -179)$ on the graph of the function.

72) $7x^2 + 70 = 0$ use Finding square roots
if $x^2 = d$ then $x = \pm\sqrt{d}$

$7x^2 = -70$

$x^2 = -10$

$x = \pm\sqrt{-10} \Rightarrow x = \pm i\sqrt{10}$

73) $-3\left(\frac{1}{6}\right)^{-3}$ Order of operations: Exponents before multiplication.

$-3(6)^3$ recall $\left(\frac{1}{b}\right)^{-n} = b^n$

$-3(216)$

-648