6D

① Find r and 7th term:

a) 16, 8, 4 ... $\boxed{r = \frac{1}{2}}$

* $u_n = u_1 (r)^{n-1}$

$u_7 = 16\left(\frac{1}{2}\right)^6$

$= 16\left(\frac{1}{64}\right)$

$= \boxed{\frac{1}{4}}$

b) $-4, 12, -36, \ldots$ $\boxed{r = -3}$

$u_7 = -4(-3)^6$

$= \boxed{-2916}$

c) 1, 10, 100, ... $r = 10$

$u_7 = 1(10)^6$

$= \boxed{1{,}000{,}000}$

d) 25, 10, 4 $\boxed{r = \frac{2}{5}}$

$u_7 = 25\left(\frac{2}{5}\right)^6$

$= \boxed{\frac{64}{625}}$

e) $2, 6x, 18x^2$ $\boxed{r = 3x}$

$u_7 = 2(3x)^6$

$= \boxed{1450x^6}$

f) $a^7b, a^6b^2, a^5b^3, \ldots$ $\boxed{r = \frac{b}{a}}$

$u_7 = a^7b\left(\frac{b}{a}\right)^6$

$= \frac{a^7 b b^6}{a^6}$

$= \boxed{ab^7}$

6E

① $u_2 = 50$

$u_5 = 3.2$

$u_2(r)^3 = u_5$

$50r^3 = 3.2$

$r^3 = \frac{3.2}{50}$

$r = \sqrt[3]{\frac{3.2}{50}}$

$\boxed{r = .4}$

② $u_3 = -18$

$u_6 = 144$

$u_3(r^3) = u_6$

$-18(r^3) = 144$

$r^3 = \frac{144}{-18}$

$r^3 = -8$

$\boxed{r = -2}$

③

a) $16, 24, 36, \ldots$

$r = \frac{24}{16} = \frac{3}{2}$

$1000 < 16\left(\frac{3}{2}\right)^{n-1}$

$\frac{1000}{16} < \left(\frac{3}{2}\right)^{n-1}$

$\log_{\frac{3}{2}}\left(\frac{1000}{16}\right) < \log_{\frac{3}{2}}\left(\frac{3}{2}\right)^{n-1}$

$10.199 < n-1$

$11.199 < n$

$\boxed{12}$

b) $1, 2.4, 5.76$

$r = 2.4$

$1000 < 1(2.4)^{n-1}$

$1000 < 2.4^{n-1}$

$\log_{2.4} 1000 < \log_{2.4} 2.4^{n-1}$

$7.89 < n-1$

$8.89 < n$

$\boxed{9}$

c) $112, -168, 252, \ldots$

$r = -1.5$

$1000 < 112(-1.5)^{n-1}$

$8.93 < (-1.5)^{n-1}$

neg #, can't use log so use calculator table

17 is the first value that works

d) $50, 55, 60.5, \ldots$

$r = \frac{11}{10}$

$1000 < 50\left(\frac{11}{10}\right)^{n-1}$

$20 < \left(\frac{11}{10}\right)^{n-1}$

$20 < 1.1^{n-1}$

$\log_{1.1} 20 < \log_{1.1} 1.1^{n-1}$

$31.4 < n-1$

$32.4 < n$

$\boxed{33}$

④ $u_1 = 9$

$u_3 = 144$

$u_1 (r)^2 = u_3$

$9r^2 = 144$

$r^2 = \frac{144}{9}$

$r = \pm \frac{12}{3}$

$\boxed{r = \pm 4}$

If $r = 4$

$u_2 = 9(4)$

$= \boxed{36}$

If $r = -4$

$u_2 = 9(-4)$

$= \boxed{-36}$

---

⑤ $18, P, 40.5$

$u_1 (r^2) = u_3$

$18r^2 = 40.5$

$r^2 = \frac{40.5}{18}$

$r = \pm 1.5$

If $r = 1.5$

$P = 18(1.5)$

$= \boxed{27}$

If $r = -1.5$

$P = 18(-1.5)$

$= \boxed{-27}$

---

⑥ $7x-2, \; 4x+4, \; 3x$

$r = \frac{4x+4}{7x-2}$ and $r = \frac{3x}{4x+4}$

$\frac{4x+4}{7x-2} = \frac{3x}{4x+4}$

$3x(7x-2) = (4x+4)(4x+4)$

$\rightarrow 21x^2 - 6x = 16x^2 + 32x + 16$

$5x^2 - 38x - 16 = 0$

$x = \frac{38 \pm \sqrt{38^2 - 4(5)(-16)}}{10}$

$x = \frac{38 \pm \sqrt{1764}}{10}$

$x = \frac{38 \pm 42}{10}$ $\rightarrow \boxed{x = 8}$ $\rightarrow \boxed{x = -.4}$