HW 2.2

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5) $12, \; 12r, \; 12r^2, \; \boxed{48 = 12r^3}$

2 GEOMETRIC MEANS

$$\boxed{\begin{aligned} 48 &= 12r^3 \\ \frac{48}{12} &= r^3 \\ 4 &= r^3 \\ \sqrt[3]{4} &= r \end{aligned}}$$

12	$12(\sqrt[3]{4})$	$12\sqrt[3]{16}$	48
12	$12(\sqrt[3]{4})$	$24(\sqrt[3]{2})$	48

16) $t_4 + t_5 = -3 \qquad t_3 + t_4 = -6$

a	ar^1	ar^2	ar^3	ar^4	ar^5
t_1	t_2	t_3	t_4	t_5	t_6

① $ar^3 + ar^4 = -3 \qquad ar^2 + ar^3 = -6$

FACTOR $ar^3(1+r) = -3 \qquad ar^2(1+r) = -6$

② DIVIDE $\frac{\cancel{ar^3}(\cancel{1+r})}{\cancel{ar^2}(\cancel{1+r})} = \frac{-3}{-6}$

$\boxed{r = \frac{1}{2}}$

③ $a\left(\frac{1}{2}\right)^2\left(1+\frac{1}{2}\right) = -6$ ⟸ PLUG BACK INTO ORIGINAL EQN.

$a\left(\frac{1}{4}\right)\left(\frac{3}{2}\right) = -6$

$a = -\frac{\cancel{6}^2(8)}{\cancel{3}}$

$\boxed{a = -16}$

④ $t_2 = a \times r^{n-1}$

$= a \times r$

$= -16\left(\frac{1}{2}\right)$

$= -8$

#3b) $S_2 = 5 \qquad S_4 = 85$

① $a, \; ar, \; ar^2, \; ar^3, \; ar^4, \; ar^5$

$S_2 = \cancel{a} + \cancel{ar} = 5$

$S_4 = \cancel{a} + \cancel{ar} + ar^2 + ar^3 = 85$ } SUBTRACT

$ar^2 + ar^3 = 80$

② DIVIDE $\boxed{ar^2(1+r) = 80} \qquad a + ar = 5 \quad \boxed{a(1+r) = 5}$

$\frac{\cancel{a}r^2(\cancel{1+r})}{\cancel{a}(\cancel{1+r})} = \frac{80}{5}$

$r^2 = 16$

$\boxed{r = \pm 4}$ ⟵ THIS MEANS THERE ARE 2 SETS OF ANSWERS

2h) $x-3, \; x, \; 3x+4, \ldots\ldots (x+4)^6$

• GEOMETRIC!

$\frac{t_2}{t_1} = \frac{t_3}{t_2} =$ COMMON RATIO!

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

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

$3x^2 - 9x + 4x - 12 = x^2$

$2x^2 - 5x - 12 = 0$ } FACTOR

$(2x+3)(x-4) = 0$

SET #1) $x = 4$

$1, \; 4, \; 16, \ldots\ldots (8)^6$

$2^0, \; 2^2, \; 2^4, \ldots\ldots 2^{12}$

0, 2, 4, 8, 10, 12 — 6 TERMS

SET #2 $x = -\frac{3}{2}$

$-\frac{9}{2}, \; -\frac{3}{2}, \; -\frac{1}{2}, \ldots\ldots \left(\frac{625}{32}\right)$

$2x^2 - 5x - 12 = 0$

$(2x+3)(x-4)=0$

$\boxed{x = -\frac{3}{2} \qquad x = 4}$

$-\frac{9}{2}, -\frac{3}{2}, -\frac{1}{2}, \ldots\ldots \left(\frac{81}{32}\right)$

$-\frac{3}{2} + \frac{8}{2} = \left(\frac{5}{2}\right)^4$

NOT A TERM IN THIS SEQUENCE!

N/A

3c)

$S_3 = 19 \qquad S_\infty = 27 \qquad r = ?$

$\boxed{\frac{a(r^3-1)}{r-1} = 19.}$ FORMULA FOR GEO. SUM

$\boxed{\frac{a}{1-r} = 27}$ FORMULA FOR INFINITE SUM

$$\frac{a(r^3-1)}{r-1} \div \frac{a}{1-r} = \frac{19}{27}$$

$$\frac{\cancel{a}(r^3-1)}{\cancel{r-1}} \times \frac{\overset{-1}{\cancel{1-r}}}{\cancel{a}} = \frac{19}{27}$$

$$r^3 - 1 = -\frac{19}{27}$$

$$r^3 - 1 = -\frac{19}{27}$$

$$r^3 = -\frac{19}{27} + \frac{27}{27}$$

$$r^3 = \frac{8}{27}$$

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

$\boxed{\frac{1-r}{r-1} = -1}$

19 + 27 = 46

27 − 19

SECTION 2.2

#3c) $S_3 = 19 \qquad \boxed{S_\infty = 27} \qquad r = ?$

① $\boxed{S_3 = \frac{a(r^n-1)}{r-1} = 19}$ $\boxed{\frac{a}{1-r} = 27}$

$\boxed{S_3 = \frac{a(1-r^3)}{1-r} = 19}$

② $\left(\frac{a}{1-r}\right)(1-r^3) = 19$

$27(1-r^3) = 19$

$1 - r^3 = \frac{19}{27}$

2f)

$\frac{a^3}{b}, a^2, ab, \ldots\ldots \frac{b^{15}}{a^{13}}$

① COMMON RATIO.

$\frac{ab}{a^2} = \boxed{\frac{b}{a} = r}$

② $a^3, a^2, a, 1, \frac{1}{a}, \frac{1}{a^2}, \frac{1}{a^3}, \ldots\ldots \frac{1}{a^{13}}$

$27(1-r^3)=19$

$1-r^3=\frac{19}{27}$

$\frac{27}{27}-\frac{19}{27}=r^3$

$\frac{8}{27}=r^3$

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

(2) $\underbrace{a^3, a^2, a, a^0}_{4\text{ terms}}, \underbrace{\frac{1}{a^1}, \frac{1}{a^2}, \frac{1}{a^3}, \ldots\ldots \frac{1}{a^{13}}}_{13\text{ terms}}$ $+$ $=17$

(3) $\underbrace{\frac{1}{b}, b^0}_{2}, \underbrace{b^1, b^2, b^3, \ldots\ldots b^{15}}_{15}$ $=17$

Side Topic:

$\sqrt{3}\cdot\sqrt[3]{3}$

$3^{\frac{1}{2}}\cdot 3^{\frac{1}{3}}$

$3^{\frac{1}{2}+\frac{1}{3}}$

$3^{\frac{3}{6}+\frac{2}{6}}$

$=3^{5/6}=\boxed{\sqrt[6]{3^5}}$

$\sqrt{3}=3^{1/2}$

$\sqrt{3}(\sqrt{3})=3^{1/2}\cdot 3^{1/2}$

$3=3^{\frac{1}{2}+\frac{1}{2}}=3^1$

$\sqrt[3]{3}=3^{1/3}$

#10) $\sqrt{3}, \sqrt[3]{3}, \ldots\ldots$

$3^{1/2}, 3^{1/3}$

$3^{\frac{3}{6}}, 3^{\frac{2}{6}}, 3^{\frac{1}{6}}, 3^0, 3^{-1/6}$

$\times 3^{-\frac{1}{6}}$ $\times 3^{-1/6}$

$t_3=3^{1/6}$

#12) $S_n=3\left(\frac{1}{5}\right)^{n-1}$

$t_5=S_5-S_4$

$t_4=S_4-S_3$

$\boxed{r=\frac{t_5}{t_4}=\frac{S_5-S_4}{S_4-S_3}}$

#5) $\underline{12}\ \underline{12r}\ \underline{12r^2}\ \underline{48}=12r^3$

$48=12r^3$

$4=r^3$

$\boxed{\sqrt[3]{4}=r}$

$t_{,7}=12\left(\sqrt[3]{4}\right)$

$t_2 = 12\left(\sqrt[3]{4}\right)$

$t_3 = 12\left(\sqrt[3]{16}\right) = 24\left(\sqrt[3]{2}\right)$ //

#6) $2x+2,\ 3x+3$

$\dfrac{3x+3}{2x+2} = \dfrac{2x+2}{x}$; $x \neq -1$ N.P.V.

$\dfrac{3}{2} = \dfrac{2(x+1)}{x}$

$3x = 4x+4$

$\boxed{-4 = x}$ //

$\dfrac{6}{4} = \dfrac{3}{2}$ $\quad \dfrac{9}{6} = \dfrac{3}{2}$