

Pg 612 # 83, 85, 87, 89

⑧③ let $c_i = \#$ of seats in the i^{th} row

$$c_i = 4(i-1) + 20 = 4i + 16$$

$$S_{20} = \sum_{i=1}^{30} (4i+16) = \frac{30(20+136)}{2}$$
$$= 15(156) = 2340$$

The auditorium contains 2340 seats.

⑧⑤ let $b_i = \#$ of bricks in the i^{th} row

$$S_{18} = \sum_{i=1}^{18} b_i = \frac{18(14+31)}{2} = 9(45) = 405$$

The brick patio contains 405 bricks.

87) let $d_i =$ distance the object falls (m)
during the i^{th} second

$$d_i = 9.8(i-1) + 4.9$$
$$= 9.8i - 4.9$$

$$S_{10} = \sum_{i=1}^{10} (9.8i - 4.9) = \frac{10(4.9 + 93.1)}{2}$$
$$= 10(98) = 980$$

The object falls 980 m in the first 10 seconds.

89) let $a_n =$ prize amt (\$) for the n^{th} place

$$a) a_n = -25(n-1) + 200$$
$$= -25n + 225$$

$$b) S_8 = \sum_{i=1}^8 a_n = \frac{8(200 + 25)}{2}$$
$$= 4(225) = 900$$

The total amount of prize money awarded at the competition is \$900.

Partial Review

① a) $a_n = (n+2)^2$, $n \in \mathbb{N}$ or n starts with 1

b) $a_n = -1.4(n-1) + 45.3$
 $= -1.4n + 46.7$

② let $h_n =$ height (cm) of the n^{th} bounce

a) $h_n = 64 \left(\frac{3}{4}\right)^{n-1}$

b) $S_7 = \sum_{n=1}^7 h_n = 64 \left(\frac{1 - \left(\frac{3}{4}\right)^7}{1 - \frac{3}{4}} \right)$

$$= \frac{14197}{64} \approx 221.828$$

The total of all the heights attained by the ball in the first 7 bounces is 221.8 cm.

③ a) $S_4 = \sum_{n=1}^4 3 \left(-\frac{2}{3}\right)^{n-1} = 3 \left(\frac{1 - \left(-\frac{2}{3}\right)^4}{1 + \frac{2}{3}} \right)$
 $= \frac{13}{9}$

$$\textcircled{3} \text{ b) } \sum_{k=3}^{15} \frac{k^2}{k^2+1} \approx 12.688$$

$$\text{c) } \sum_{i=4}^{16} \frac{4+2i}{3} = \frac{13(4+12)}{2} = 13(8) = 104$$

$$\text{d) } \sum_{j=0}^{\infty} 4 \left(-\frac{2}{5}\right)^j = \frac{4}{1+\frac{2}{5}} = \frac{4}{\frac{7}{5}} = \frac{20}{7}$$

$$\text{e) } \sum_{n=0}^{\infty} 2^n \text{ diverges since } |r|=2 > 1$$

$$\textcircled{4} \text{ a) } \frac{2}{27+1} + \frac{6}{64+2} + \frac{24}{125+3} + \frac{120}{216+4} + \dots = \sum_{i=1}^{\infty} \frac{(i+1)!}{(i+2)^3 + i}$$

$$\text{b) } \frac{1}{2} - \frac{3}{4} + \frac{9}{8} - \frac{27}{16} + \dots + \frac{6561}{512} = \sum_{i=1}^9 \frac{1}{2} \left(-\frac{3}{2}\right)^{i-1}$$