

1. A geometric sequence has all its terms positive. The first term is 7 and the third term is 28.
- (a) Find the common ratio.
- (b) Find the sum of the first 14 terms.

Working:

Answers:

(a)

(b)

(Total 6 marks)

2. (a) The first term of an arithmetic sequence is -16 and the eleventh term is 39 .
Calculate the value of the common difference.

(b) The third term of a geometric sequence is 12 and the fifth term is $\frac{16}{3}$.

All the terms in the sequence are positive.
Calculate the value of the common ratio.

Working:

Answers:

(a)

(b)

(Total 8 marks)

3. Consider the geometric sequence 8, a , 2,... for which the common ratio is $\frac{1}{2}$.

- (a) Find the value of a .
- (b) Find the value of the eighth term.
- (c) Find the sum of the first twelve terms.

Working:

Answers:

- (a)
- (b)
- (c)

(Total 6 marks)

4. A basketball is dropped vertically. It reaches a height of 2 m on the first bounce. The height of each subsequent bounce is 90% of the previous bounce.

- (a) What height does it reach on the 8th bounce?

(2)

- (b) What is the total vertical distance travelled by the ball between the first and sixth time the ball hits the ground?

(4)

(Total 6 marks)

1. (a) For obtaining an equation in r^2 , can be implied

(M1)

$$28 = 7r^2$$

(A1)

$$r = 2$$

(A1) (C3)

- (b) For using their value of r in the GP sum formula
For obtaining 114681 (accept fewer s.f. up to 115000)

(M1)

(M1) (A1)

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2. (a) $u_1 = -16, u_1 + 10d = 39$ (M1)

$$-16 + 10d = 39 \quad (\text{A1})$$

Note: Award (M1) for correct formula, (A1) for correct numbers.

$$10d = 39 + 16 = 55 \quad (\text{A1})$$

$$d = 5.5 \quad (\text{A1}) \quad (\text{C4})$$

(b) $u_1 r^2 = 12$ (M1)

$$u_1 r^4 = \frac{16}{3} \quad (\text{A1})$$

Note: Award (M1) for correct formula, (A1) for correct numbers.

$$r^2 = \frac{\left(\frac{16}{3}\right)}{12} = \frac{16}{36} = \frac{4}{9} \quad (\text{M1})$$

$$r = \frac{2}{3} \quad (\text{A1}) \quad (\text{C4})$$

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3. (a) $\frac{a}{8} = \frac{1}{2}$

$$a = 4 \quad (\text{A1})$$

OR

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

$$a = 4 \quad (\text{A1}) \quad (\text{C1})$$

(b) $8\left(\frac{1}{2}\right)^7 = 0.0625$

(M1)

)(A1)(ft)

OR

$2\left(\frac{1}{2}\right)^5 = 0.0625$

(M1
(C2)

)(A1)(ft)

(c) $\frac{8\left(\frac{1}{2}\right)^{12} - 1}{\frac{1}{2} - 1} = 16.0 (3 \text{ s.f.}) \quad (= 4095/256)$

(M1)

)(A1)(ft)

(A1)
(C3)

(ft)

***Note:** Award (M1) for using correct formula and correct substitution, (A1) for correct answer (15.99...). (A1) for correct answer to 3 s.f.*

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4. (a) $u_n = 2(0.9)^7 = 0.957 \text{ m}$

(M1)(A1)

***Note:** Award (M1) for substitution into formula, list or suitable diagram.*

(b) $S_n = \frac{2(1 - (0.9)^5)}{1 - (0.9)} = 8.19 \text{ m}$

(M1)(M1)(A1)

***Note:** Award (M1) for substitution into formula, list or suitable diagram.*

Total distance travelled = $2 \times 8.19 = 16.4 \text{ m}$.

(A1) 4
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