SATPREP
Assignment : *Arithmetic Sequence*

1 Find the 10th term of each of the following arithmetic sequences:

a 19, 25, 31, 37, ... **b** 101, 97, 93, 89, ... **c** $8, 9\frac{1}{2}, 11, 12\frac{1}{2}, ...$

2 Find the 15th term of each of the following arithmetic sequences:

a 31, 36, 41, 46, ... **b** $5, -3, -11, -19, ...$ **c** $a, a+d, a+2d, a+3d, ...$

3 Consider the sequence 6, 17, 28, 39, 50, ...

a Show that the sequence is arithmetic.
b Find the formula for its general term.
c Find its 50th term.
d Is 325 a member?
e Is 761 a member?

4 Consider the sequence 87, 83, 79, 75, 71, ...

a Show that the sequence is arithmetic.
b Find the formula for its general term.
c Find the 40th term.
d Which term of the sequence is -297?

5 A sequence is defined by $u_n = 3n - 2$.

a Prove that the sequence is arithmetic. **Hint:** Find $u_{n+1} - u_n$.
b Find u_1 and d.
c Find the 57th term.
d What is the largest term of the sequence that is smaller than 450? Which term is this?

6 A sequence is defined by $u_n = \dfrac{71 - 7n}{2}$.

a Prove that the sequence is arithmetic. **b** Find u_1 and d. **c** Find u_{75}.
d For what values of n are the terms of the sequence less than -200?

7 Find k given the consecutive arithmetic terms:

a $32, k, 3$ **b** $k, 7, 10$ **c** $k+1, 2k+1, 13$
d $k-1, 2k+3, 7-k$ **e** k, k^2, k^2+6 **f** $5, k, k^2-8$

8 Find the general term u_n for an arithmetic sequence with:

a $u_7 = 41$ and $u_{13} = 77$ **b** $u_5 = -2$ and $u_{12} = -12\frac{1}{2}$
c seventh term 1 and fifteenth term -39
d eleventh and eighth terms being -16 and $-11\frac{1}{2}$ respectively.

9 **a** Insert three numbers between 5 and 10 so that all five numbers are in arithmetic sequence.

b Insert six numbers between -1 and 32 so that all eight numbers are in arithmetic sequence.

10 Consider the arithmetic sequence $36,\ 35\frac{1}{3},\ 34\frac{2}{3},\ ....$

a Find u_1 and d. **b** Which term of the sequence is -30?

11 An arithmetic sequence starts $23,\ 36,\ 49,\ 62,\ ....$ What is the first term of the sequence to exceed 100 000?

12 A luxury car manufacturer sets up a factory for a new model. In the first month only 5 cars are produced. After this, 13 cars are assembled every month.

a List the total number of cars that have been made in the factory by the end of each of the first six months.

b Explain why the total number of cars made after n months forms an arithmetic sequence.

c How many cars are made in the first year?

d How long is it until the 250th car is manufactured?

13 Valéria joins a social networking website. After 1 week she has 34 online friends. At the end of 2 weeks she has 41 friends, after 3 weeks she has 48 friends, and after 4 weeks she has 55 friends.

a Show that Valéria's number of friends forms an arithmetic sequence.

b Assuming the pattern continues, find the number of online friends Valéria will have after 12 weeks.

c After how many weeks will Valéria have 150 online friends?

14 A farmer feeds his cattle herd with hay every day in July. The amount of hay in his barn at the end of day n is given by the arithmetic sequence $u_n = 100 - 2.7n$ tonnes.

a Write down the amount of hay in the barn on the first three days of July.

b Find and interpret the common difference.

c Find and interpret u_{25}.

d How much hay is in the barn at the beginning of August?

Answer

1 **a** 73 **b** 65 **c** $21\frac{1}{2}$

2 **a** 101 **b** -107 **c** $a + 14d$

3 **a** $u_1 = 6,\ d = 11$ **b** $u_n = 11n - 5$ **c** 545
d yes, u_{30} **e** no

4 **a** $u_1 = 87,\ d = -4$ **b** $u_n = 91 - 4n$ **c** -69 **d** u_{97}

5 **b** $u_1 = 1,\ d = 3$ **c** 169 **d** $u_{150} = 448$

6 **b** $u_1 = 32,\ d = -\frac{7}{2}$ **c** -227 **d** $n \geqslant 68$

7 **a** $k = 17\frac{1}{2}$ **b** $k = 4$ **c** $k = 4$ **d** $k = 0$
e $k = -2$ or 3 **f** $k = -1$ or 3

8 **a** $u_n = 6n - 1$ **b** $u_n = -\frac{3}{2}n + \frac{11}{2}$
c $u_n = -5n + 36$ **d** $u_n = -\frac{3}{2}n + \frac{1}{2}$

9 **a** $6\frac{1}{4}, 7\frac{1}{2}, 8\frac{3}{4}$ **b** $3\frac{5}{7}, 8\frac{3}{7}, 13\frac{1}{7}, 17\frac{6}{7}, 22\frac{4}{7}, 27\frac{2}{7}$

10 **a** $u_1 = 36,\ d = -\frac{2}{3}$ **b** u_{100} **11** $u_{7692} = 100\,006$

12 **a** Month 1 = 5 cars Month 4 = 44 cars
Month 2 = 18 cars Month 5 = 57 cars
Month 3 = 31 cars Month 6 = 70 cars
b The constant difference $d = 13$. **c** 148 cars
d 20 months

13 **a** $u_1 = 34,\ d = 7$ **b** 111 online friends **c** 18 weeks

14 **a** Day 1 = 97.3 tonnes, Day 2 = 94.6 tonnes,
Day 3 = 91.9 tonnes
b $d = -2.7$, the cattle eat 2.7 tonnes of hay each day.
c $u_{25} = 32.5$. After 25 days (that is, July 25th) there will be 32.5 tonnes of hay left.
d 16.3 tonnes

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