

**Higher IGCSE (9 – 1) Revision Pack**

**Sequences and Series (Part 3)**

**Name --------------------------------**

**Q1.**

Sue is training for a marathon. Her training includes a run every Saturday starting with a run of 5 km on the first Saturday. Each Saturday she increases the length of her run from the previous Saturday by 2 km.

(a)  Show that on the 4th Saturday of training she runs 11 km.

**(1)**

(b)  Find an expression, in terms of *n*, for the length of her training run on the *n*th Saturday.

**(2)**

(c)  Show that the total distance she runs on Saturdays in *n* weeks of training is *n*(*n* + 4) km.

**(3)**

On the *n*th Saturday Sue runs 43 km.

(d)  Find the value of *n*.

**(2)**

(e)  Find the total distance, in km, Sue runs on Saturdays in *n* weeks of training.

**(2)**

**(Total 10 marks)**

**Q2.**

A company offers two salary schemes for a 10-year period, Year 1 to Year 10 inclusive.

Scheme 1:    Salary in Year 1 is £*P*.

                     Salary increases by £(2*T*) each year, forming an arithmetic sequence.

Scheme 2:    Salary in Year 1 is £(*P* + 1800).

                     Salary increases by £*T* each year, forming an arithmetic sequence.

(a) Show that the **total** earned under Salary Scheme 1 for the 10-year period is

£(10*P* + 90*T*)

**(2)**

For the 10-year period, the **total** earned is the same for both salary schemes.

(b) Find the value of *T*.

**(4)**

For this value of *T*, the salary in Year 10 under Salary Scheme 2 is Â£29 850

(c) Find the value of *P*.

**(3)**

**(Total 9 marks)**

**Q3.**

An arithmetic sequence has first term *a* and common difference *d*. The sum of the first 10 terms of the sequence is 162.

(a) Show that 10*a* + 45*d* =162

**(2)**

Given also that the sixth term of the sequence is 17,

(b) write down a second equation in *a* and *d*,

**(1)**

(c) find the value of *a* and the value of *d*.

**(4)**

**(Total 7 marks)**

**Q4.**

A boy saves some money over a period of 60 weeks. He saves 10p in week 1, 15p in week 2, 20p in week 3 and so on until week 60. His weekly savings form an arithmetic sequence.

(a)  Find how much he saves in week 15

**(2)**

(b)  Calculate the total amount he saves over the 60 week period.

**(3)**

The boy's sister also saves some money each week over a period of *m* weeks. She saves 10p in week 1, 20p in week 2, 30p in week 3 and so on so that her weekly savings form an arithmetic sequence. She saves a total of £63 in the *m* weeks.

(c)  Show that

*m*(*m* + 1) = 35 × 36

**(4)**

(d)  Hence write down the value of *m*.

**(1)**

**(Total 10 marks)**

**Q5.**

The first term of an arithmetic series is *a* and the common difference is *d*.

The 18th term of the series is 25 and the 21st term of the series is 32.

(a) Use this information to write down two equations for *a* and *d*.

**(2)**

(b) Show that *a* = −17.5 and find the value of *d*.

**(2)**

The sum of the first *n* terms of the series is 2750.

(c) Show that *n* is given by

*n*2−15*n* = 55 × 40.

**(4)**

(d) Hence find the value of *n*.

**(3)**

**(Total 11 marks)**

**Q6.**

A farmer has a pay scheme to keep fruit pickers working throughout the 30 day season.
He pays £*a* for their first day, £(*a* + *d*) for their second day, £(*a* + 2*d*) for their third day, and so on, thus increasing the daily payment by £*d* for each extra day they work.

A picker who works for all 30 days will earn £40.75 on the final day.

(a)  Use this information to form an equation in *a* and *d*.

**(2)**

A picker who works for all 30 days will earn a total of £1005

(b)  Show that 15(*a* + 40.75) = 1005

**(2)**

(c)  Hence find the value of *a* and the value of *d*.

**(4)**

**(Total 8 marks)**

**Q7.**

Jill gave money to a charity over a 20-year period, from Year 1 to Year 20 inclusive. She gave £150 in Year 1, £160 in Year 2, £170 in Year 3, and so on, so that the amounts of money she gave each year formed an arithmetic sequence.

(a) Find the amount of money she gave in Year 10.

**(2)**

(b) Calculate the total amount of money she gave over the 20-year period.

**(3)**

Kevin also gave money to the charity over the same 20-year period.

He gave £*A* in Year 1 and the amounts of money he gave each year increased, forming an arithmetic sequence with common difference £30.
The total amount of money that Kevin gave over the 20-year period was **twice** the total amount of money that Jill gave.

(c) Calculate the value of *A*.

**(4)**

**(Total 9 marks)**

**Q8.**

A 40-year building programme for new houses began in Oldtown in the year 1951 (Year 1) and finished in 1990 (Year 40).

The numbers of houses built each year form an arithmetic sequence with first term *a* and common difference *d*.

Given that 2400 new houses were built in 1960 and 600 new houses were built in 1990, find

(a)  the value of *d*,

**(3)**

(b)  the value of *a*,

**(2)**

(c)  the total number of houses built in Oldtown over the 40-year period.

**(3)**

**(Total 8 marks)**

**Q9.**

Each year, Abbie pays into a savings scheme. In the first year she pays in £500. Her payments then increase by £200 each year so that she pays £700 in the second year, £900 in the third year and so on.

(a)  Find out how much Abbie pays into the savings scheme in the tenth year.

**(2)**

Abbie pays into the scheme for *n* years until she has paid in a total of £67200.

(b)  Show that *n*2 + 4*n* − 24 × 28 = 0

**(5)**

(c)  Hence find the number of years that Abbie pays into the savings scheme.

**(2)**

**(Total 9 marks)**

**Q10.**

In the year 2000 a shop sold 150 computers. Each year the shop sold 10 more computers than the year before, so that the shop sold 160 computers in 2001, 170 computers in 2002, and so on forming an arithmetic sequence.

(a) Show that the shop sold 220 computers in 2007.

**(2)**

(b) Calculate the total number of computers the shop sold from 2000 to 2013 inclusive.

**(3)**

In the year 2000, the selling price of each computer was £900. The selling price fell by £20 each year, so that in 2001 the selling price was £880, in 2002 the selling price was £860, and so on forming an arithmetic sequence.

(c) In a particular year, the selling price of each computer in £s was equal to three times the number of computers the shop sold in that year. By forming and solving an equation, find the year in which this occurred.

**(4)**

**(Total 9 marks)**

**End of questions**