Linear Patterns

1. In each of the following linear sequences, find:
   (a) The start term
   (b) The common difference
   (c) The nth term(general term)
   (d) The value of the given term
       i. $14, 18, 22, 26, 30...$ Find 10th term
       ii. $4, 10, 16, 22, 28, 34...$ Find 12th term
       iii. $10, 22, 34, 46, 58...$ Find 18th term
       iv. $19, 29, 39, 49, 59...$ Find 35th term
       v. $0, 7, 14, 21, 28...$ Find 100th term
       vi. $75, 84, 93, 102, 111...$ Find 27th term
       vii. $22, 20, 18, 16, 14...$ Find 50th term
       viii. $250, 280, 310, 340, 370...$ Find 10th term
       ix. $22, 12, 2, -8, -18...$ Find 30th term

2. Find an expression for the nth term of this sequence:

   $7, 11, 15, 19, ...$

   Use the expression for the nth term to find T_{10} and T_{20}.

3. Find an expression for T_n of the sequence $8, 5, 2, ...$ For what value of n is $T_n = -34$?

4. If $T_n = 2_n + 1$, write out the first five terms of the sequence.Illustrate this sequence on a graph,putting the term numbers on the horizontal axis. Explain why the graph is in a straight line.

5. The graph shows a plumbers charge when called to do a repair job on a boiler.
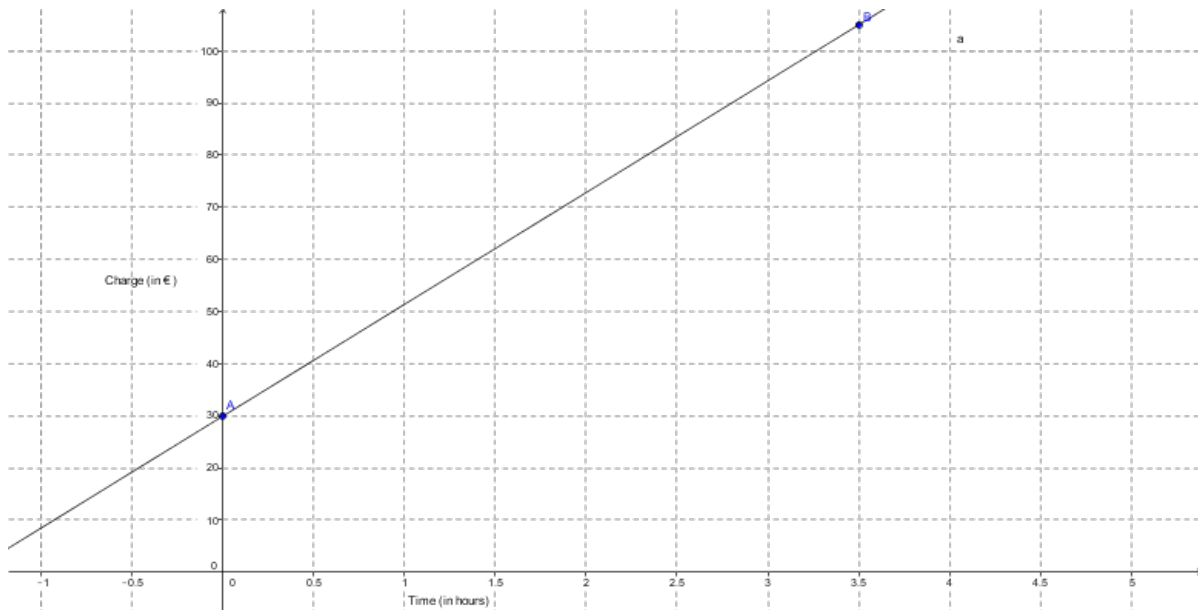
  i. What is the initial or 'call-out' charge?

  ii. How much does he charge for a job that lasts $3\frac{1}{2}$ hours?

  iii. If he charges 135, how many hours has he worked?

  iv. Do his charges form a linear sequence? Explain your conclusion

  v. Use the graph to work out what the plumber charges for each hour of actual work(i.e. excluding the 'call-out' charge)

  vi. Investigate if the slope of the line is the same as the rate he charges for each hour's work.

  vii. If the work lasted 10 hours, use the sequence to work out what the charge would be.

6. A fast growing plant is $4cm$ in height when purchased. It grows $2cm$ per day each day afterwards. Copy and compleltre the table showing the height of the plant in the first seven days.

Day	Height(cm)
1	4
2	6
3	8
.....	.....

  i. Draw a graph to show the height of the plant for Day 1.....Day 7.

  ii. How many days will it take for the plant to reach $30cm$?

  iii. The plant will stop growing when it reaches a height of $60cm$. How many days will this take?

  iv. What is the slope of the line you have drawn?

v. What is the rate of change of growth per day in the table?

vi. What is the connection between your answers in (iv) and(v) above?

7. Here are three graphs and three sequences.
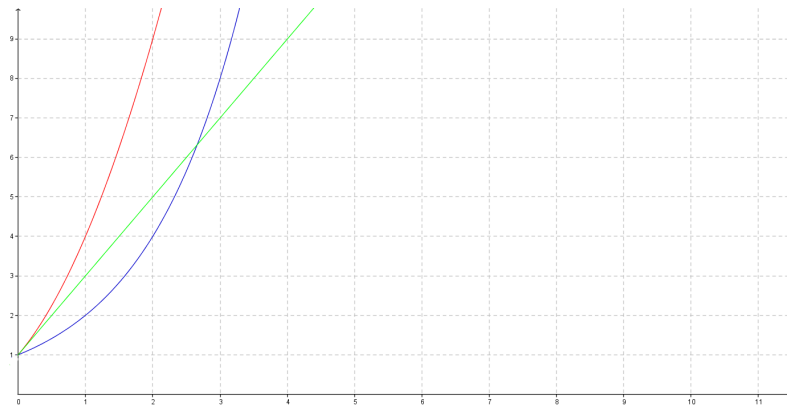
Which sequence does each graph represent?

(a) : $2, 4, 8, 16, ...$

(b) : $4, 9, 16, 25, 36...$

(c) : $3, 5, 7, 9, 11...$