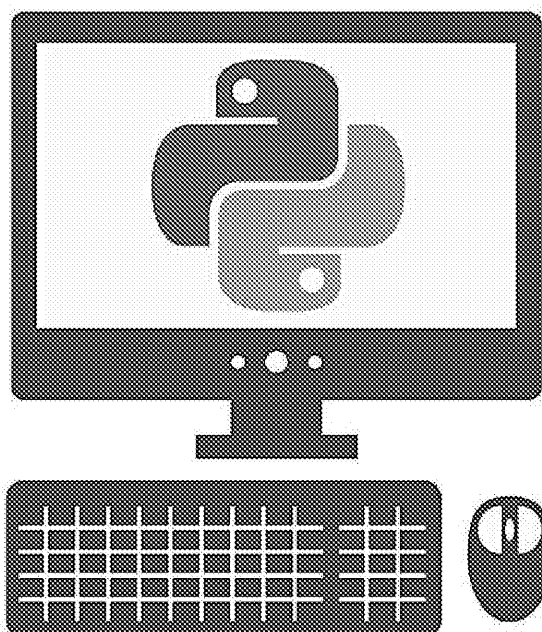


Python Challenges

for KS3 and KS4

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Contents List

Thank You for Choosing ZigZag Education	ii
Teacher Feedback Opportunity	iii
Terms and Conditions of Use	iv
Teacher's Introduction	v

Python Challenges

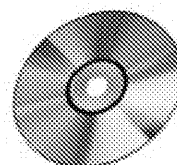
Cut-out cards (4 to a page)	30 A4 pages
A5 booklet	8 A4 pages

Marking

Suggested Mark Scheme	2 A4 pages
Marking Grid	1 A4 pages
Code Solutions	10 A4 pages

On CD:

- Python_challenges.pptx
*PowerPoint presentation – tasks only
(for student use)*
- Python_complete.pptx
*PowerPoint presentation – tasks, solutions and
marking guidance (for teacher use)*
- Solutions (folder)
Completed Python scripts for all 30 challenges



Teacher's Introduction

These challenges have been produced to support the teaching of Python to KS3 and KS4 students, and cover the programming aspects of the 2014 KS3 Computing National Curriculum. The material has been specifically designed to cover the key programming constructs of sequencing, selection, repetition, arrays and functions.

The Challenges

Each challenge includes a task for the students to complete, and a summary of the programming techniques that will need to be applied in order to solve the problem along with a difficulty rating. These ratings can be used to add an element of competition through the use of a spreadsheet to record the challenges each student has completed; this could calculate the total number of points earned per student.

A suggested approach to delivery would be to introduce the students to a concept and then get them to apply it by completing the relevant challenges. A table outlining each concept and the challenges they apply to is shown below.

Concept	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Difficulty	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	4	4	4	4	5	5	5	5
Sequencing	✓	✓	✓	✓	✓																									
Variables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Selection						✓	✓	✓	✓	✓											✓	✓	✓	✓	✓	✓	✓			
String Manipulation											✓	✓	✓	✓	✓															
Repetition																✓	✓	✓	✓	✓				✓				✓	✓	✓
Functions																					✓	✓	✓	✓		✓				✓
File Handling																									✓	✓	✓		✓	
Arrays																												✓	✓	✓

Solutions and Marking

Solutions for each of the challenges have been included in this pack; these are written in Python 3. It is possible to solve these challenges using Python 2.7; however, solutions are not provided for 2.7.

A basic mark 3-point mark scheme is provided to help marking by the teacher or to aid peer/self-assessment. If you wish to use the challenges as part of a test or some other comparison, it is suggested that the difficulty level (1-5) be used as a 'points multiplier' – this way, the more complex a challenge is, the higher number of points there are available. A marking grid has been included to enable students or teachers to record progress.

Formats

Both the challenges and the solutions are provided in a range of printed and electronic formats – see the *Contents List* for details.

Free updates

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Go to zzed.co.uk/freeupdates

** resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers*

Python Challen

Cut out card and A5 booklet



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Note that this can be also printable (with or without colour) from files on the accompanying CD.



Python Challenge

1

Challenge 1

Write a program that:

- asks the user to input their age
- outputs 'Your age is:' followed by their age

You will need to use:

Sequencing

Variables

Difficulty: |

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Python Challenge

1

Challenge 1

Write a program that:

- asks the user to input their age
- outputs 'Your age is:' followed by their age

You will need to use:

Sequencing

Variables

Difficulty: |

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Python Challenge

1

Challenge 1

You will need to use:



Python Challenge

1

Challenge 1

You will need to use:



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Python Challenge

2

Challenge 2

Write a program that:

- asks the user to input two numbers
- calculates the average
- outputs the result

You will need to use:

Sequencing

Variables

Tip: To calculate the average of two numbers you need to add them together and divide the result by two.

Difficulty: |

© ZigZag Education, 2014



Python Challenge

2

Challenge 2

You will need to use:

Challenge 2

Write a program that:

- asks the user to input two numbers
- calculates the average
- outputs the result

You will need to use:

Sequencing

Variables

Tip: To calculate the average of two numbers you need to add them together and divide them by two.

Difficulty: |

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Python Challenge

2

Challenge 2

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Python Challenge

3

Challenge 3

Write a program that:

- asks the user to input the width and height of a rectangle
- calculates the area
- outputs the result

You will need to use:

Sequencing

Variables

Tip: Multiply the width by the height to find the area of a rectangle.

Difficulty: |

© ZigZag Education, 2014



Python Challenge

3

Challenge 3

You will need to use:

Python Challenge

3

Challenge 3

Write a program that:

- asks the user to input the width and height of a rectangle
- calculates the area
- outputs the result

You will need to use:

Sequencing

Variables

Tip: Multiply the width by the height to find the area of a rectangle.

Difficulty: |

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Challenge 3

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Python Challenge

4

Challenge 4

Write a program that:

- asks the user to input two numbers
- divides the first number by the second number
- outputs the result

You will need to use:

Sequencing

Variables

Difficulty: |

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Python Challenge

4

Challenge 4

Write a program that:

- asks the user to input two numbers
- divides the first number by the second number
- outputs the result



Difficulty: |

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Python Challenge

4

Challenge 4

You will need to use:



Python Challenge

4

Challenge 4

You will need to use:



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Python Challenge

5

Challenge 5

Write a program that:

- asks the user their name
- asks what their favourite subject is (using their name in the question)
- responds to their answer by saying that you like that subject as well

You will need to use:

Sequencing

Variables

Difficulty: |

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Python Challenge

5

Challenge 5

Write a program that:

- asks the user their name
- asks what their favourite subject is (using their name in the question)
- responds to their answer by saying that you like that subject as well

You will need to use:

Sequencing

Variables

Difficulty: |

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Python Challenge

5

Challenge 5

You will need to use:



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5

Challenge 5

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Python Challenge

6

Challenge 6

Write a program that:

- asks the user their name
- if it is the same as your name, outputs 'You're cool', otherwise outputs 'Nice to meet you'

You will need to use:

Selection

Variables

Difficulty: **2**

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Python Challenge

6

Challenge 6

Write a program that:

- asks the user their name
- if it is the same as your name, outputs 'You're cool', otherwise outputs 'Nice to meet you'

You will need to use:

Selection

Variables

Difficulty: **2**

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Python Challenge

6

Challenge 6

You will need to use:



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6

Challenge 6

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Python Challenge

7



Challenge 7

Write a program that:

- asks the user how long on average they spend watching TV each day
- if it is less than 2 hours, outputs 'That shouldn't rot your brain too much'; if it is less than 4 hours per day, outputs 'Aren't you getting square eyes?'; otherwise outputs 'Fresh air beats channel flicking'

Difficulty: **2**

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You will need to use:

Selection

Variables

Python Challenge

7



Challenge 7

Write a program that:

- asks the user how long on average they spend watching TV each day
- if it is less than 2 hours, outputs 'That shouldn't rot your brain too much'; if it is less than 4 hours per day, outputs 'Aren't you getting square eyes?'; otherwise outputs 'Fresh air beats channel flicking'

Difficulty: **2**

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You will need to use:

Selection

Variables

Python Challenge

7



Challenge 7

You will need to use:

Python Challenge

7



Challenge 7

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Python Challenge

8



Challenge 8

Write a program that:

- converts and outputs marks into grades, using the following data:

Greater than or equal to 75	A
Greater than or equal to 60	B
Greater than or equal to 35	C
Less than 35	D

Difficulty: **2**

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You will need to use:

Selection

Variables

Challenge 8

Write a program that:

- converts and outputs marks into grades, using the following data:

Greater than or equal to 75	A
Greater than or equal to 60	B
Greater than or equal to 35	C
Less than 35	D

Difficulty: **2**

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You will need to use:

Selection

Variables

Python Challenge

8



Challenge 8

Write a program that:

- converts and outputs marks into grades, using the following data:

Greater than or equal to 75	A
Greater than or equal to 60	B
Greater than or equal to 35	C
Less than 35	D

Difficulty: **2**

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You will need to use:

Selection

Variables

Python Challenge

8



Challenge 8

You will need to use:

Python Challenge

8



Challenge 8

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Python Challenge

9

Challenge 9

Write a program that:

- asks the user to name one of the Olympic Values (Respect, Excellence and Friendship)
- if they correctly name one, output 'That's correct', otherwise output 'Try again'

Difficulty: **2**

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You will need to use:

Selection

Variables



Python Challenge

9

Challenge 9

Write a program that:

- asks the user to name one of the Olympic Values (Respect, Excellence and Friendship)
- if they correctly name one, output 'That's correct', otherwise output 'Try again'

Difficulty: **2**

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Challenge 9

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Challenge 9

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Python Challenge

10

Challenge 10

Write a game that:

- allows the user to play rock, paper, scissors against the computer
- must display the computer's choice and show the result of the game

You will need to use:

Selection

Variables

Tip: The computer's answer must be random.

Difficulty: 2

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Python Challenge

10

Challenge 10

You will need to use:

Challenge 10

Write a game that:

- allows the user to play rock, paper, scissors against the computer
- must display the computer's choice and show the result of the game

You will need to use:

Selection

Variables

Tip: The computer's answer must be random.

Difficulty: 2

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Challenge 10

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Python Challenge

11

Challenge 11

Write a program that:

- asks the user to input a sentence
- calculates and outputs how many characters there are in the sentence

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

11

Challenge 11

Write a program that:

- asks the user to input a sentence
- calculates and outputs how many characters there are in the sentence

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

11

Challenge 11

You will need to use:



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11

Challenge 11

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Python Challenge

12

Challenge 12

Write a program that:

- asks the user to input a sentence
- outputs the sentence in lower case



You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

12

Challenge 12

You will need to use:



Difficulty: **3**

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Python Challenge

12

Challenge 12

Write a program that:

- asks the user to input a sentence
- outputs the sentence in upper case



You will need to use:

Variables

String Manipulation

Python Challenge

12

Challenge 12

You will need to use:



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Python Challenge

13

Challenge 13

Write a program that:

- asks the user to input a sentence
- asks the user to input:
 - the word they want to replace
 - the word they want to replace it with
- outputs the new sentence

Difficulty: 3

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You will need to use:

Variables

String Manipulation



Python Challenge

13

Challenge 13

Write a program that:

- asks the user to input a sentence
- asks the user to input:
 - the word they want to replace
 - the word they want to replace it with
- outputs the new sentence

Difficulty: 3

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You will need to use:

Variables

String Manipulation



Python Challenge

13

Challenge 13

You will need to use:



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13

Challenge 13

You will need to use:



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Python Challenge

14

Challenge 14

Write a program that:

- asks the user to input a sentence
- outputs the number of times the word 'the' occurs in it

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

14

Challenge 14

Write a program that:

- asks the user to input a sentence
- outputs the number of times the word 'the' occurs in it

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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14

Challenge 14

You will need to use:



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14

Challenge 14

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Python Challenge

15

Challenge 15

Write a program that:

- asks the user to input a sentence
- outputs the sentence in lower case



You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

15

Challenge 15

Write a program that:

- asks the user to input a sentence
- outputs the sentence in lower case



You will need to use:

Variables

String Manipulation

Difficulty: **3**

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15

Challenge 15

You will need to use:



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Python Challenge

16

Challenge 16

Write a program that:

- outputs all numbers between 1 and 10



You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: 3

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Python Challenge

16

Challenge 16

Write a program that:

- outputs all numbers between 1 and 10



You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: 3

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16

Challenge 16

You will need to use:



Challenge 16

Python Challenge

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Python Challenge

17

Challenge 17

Write a program that:

- outputs all odd numbers between 1 and 99



You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: 3

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Python Challenge

17

Challenge 17

Write a program that:

- outputs all odd numbers between 1 and 99



You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: 3

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Python Challenge

17

Challenge 17

You will need to use:



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Challenge 17

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Python Challenge

18

Challenge 18

Write a program that:

- asks the user to input a number
- outputs the times table for that number

You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: 3

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Python Challenge

18

Challenge 18

Write a program that:

- asks the user to input a number
- outputs the times table for that number

You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: 3

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Python Challenge

18

Challenge 18

You will need to use:



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18

Challenge 18

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Python Challenge

19



Challenge 19

Write a program that:

- asks the user to input a number
- outputs the times table for that number
- starts again every time it finishes



You will need to use:

Variables

Repetition

Tip: You must use a For Loop and a While Loop for this challenge.

Difficulty: **3**

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Python Challenge

19



Challenge 19

Write a program that:

- asks the user to input a number
- outputs the times table for that number
- starts again every time it finishes



You will need to use:

Variables

Repetition

Tip: You must use a For Loop and a While Loop for this challenge.

Difficulty: **3**

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Python Challenge

19



Challenge 19

You will need to use:

Python Challenge

19



Challenge 19

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Python Challenge

20



Challenge 20

Write a program that:

- asks the user to input a number and repeats until they guess the number 7
- congratulate the user with 'Well Done' message when they guess correctly

You will need to use:

Variables

Repetition

Difficulty: 3

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Python Challenge

20



Challenge 20

Write a program that:

- asks the user to input a number and repeats until they guess the number 7
- congratulate the user with a 'Well Done' message when they guess correctly

You will need to use:

Variables

Repetition

Difficulty: 3

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Python Challenge

20



Challenge 20

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Python Challenge

20



Challenge 20

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Python Challenge

21

Challenge 21

Write a program that converts between centimetres, and inches and vice versa, by:

- asking the user to input a number
- asking the user to choose between converting from centimetres to inches or from inches to centimetres
- calculating and outputting the result using functions

Tip: 1 inch = 2.54 cm
1 cm = 0.393700787 inches

Difficulty: **3**

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You will need to use:

Variables

Selection

Functions



Python Challenge

21

Challenge 21

Write a program that converts between centimetres, and inches and vice versa, by:

- asking the user to input a number
- asking the user to choose between converting from centimetres to inches or from inches to centimetres
- calculating and outputting the result using functions

Tip: 1 inch = 2.54 cm
1 cm = 0.393700787 inches

Difficulty: **3**

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You will need to use:

Variables

Selection

Functions



Python Challenge

21

Challenge 21

You will need to use:



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21

Challenge 21

You will need to use:



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Python Challenge

22

Challenge 22

Write a program that:

- asks the user for the distance (in metres)
- asks the user for the time in seconds
- that a journey was completed in
- calculates and outputs the average speed using a function

Tip: $\text{Speed} = \text{Distance} / \text{Time}$

Difficulty: 3

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You will need to use:

Variables

Selection

Functions



Python Challenge

22

Challenge 22

Write a program that:

- asks the user for the distance (in metres)
- asks the user for the time in seconds
- that a journey was completed in
- calculates and outputs the average speed using a function

Tip: $\text{Speed} = \text{Distance} / \text{Time}$

Difficulty: 3

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You will need to use:

Variables

Selection

Functions



Python Challenge

22

Challenge 22

You will need to use:



Python Challenge

22

Challenge 22

You will need to use:



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Python Challenge

23

Challenge 23

A gardener needs to buy soil for a project they are working on. The garden is rectangular with a circular flower bed in the middle.

Write a program that:

- asks the user for the dimensions of the lawn and the radius of the circle (in metres)
- uses a function to calculate and output the amount of turf needed

Tip: Circle area = $\pi \times \text{Radius}^2$

Difficulty: **4**

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You will need to use:

Variables

Selection

Functions



Python Challenge

23

Challenge 23

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Python Challenge

23

Challenge 23

A gardener needs to buy turf for a project they are working on. The garden is rectangular with a circular flower bed in the middle.

Write a program that:

- asks the user for the dimensions of the lawn and the radius of the circle (in metres)
- uses a function to calculate and output the amount of turf needed

Tip: Circle area = $\pi \times \text{Radius}^2$

Difficulty: **4**

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You will need to use:

Variables

Selection

Functions



Python Challenge

23

Challenge 23

You will need to use:

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Python Challenge

24

Challenge 24

Write a function that takes two numbers. The first number indicates the number of spaces that should be displayed and the second indicates the number of Xs that should be displayed. These should both be displayed on the same line.

Now write another function that makes multiple calls to your first function and draws a picture with Xs.

Difficulty: 4

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You will need to use:

Variables

Selection

Repetition

Functions



Python Challenge

24

Challenge 24

Write a function that takes two numbers. The first number indicates the number of spaces that should be displayed and the second indicates the number of Xs that should be displayed. These should both be displayed on the same line.

Now write another function that makes multiple calls to your first function and draws a picture with Xs.

Difficulty: 4

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You will need to use:

Variables

Selection

Repetition

Functions



Python Challenge

24

Challenge 24

You will need to use:



Python Challenge

24

Challenge 24

You will need to use:



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Python Challenge

25

Challenge 25

Write a sign-up program for an after-school club; it should ask the user for the following details and store them in a file:

- First Name
- Last Name
- Gender
- Form

You will need to use:

Variables

Selection

File Handling

Difficulty: **4**

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Python Challenge

25

Challenge 25

Write a sign-up program for an after-school club; it should ask the user for the following details and store them in a file:

- First Name
- Last Name
- Gender
- Form

You will need to use:

Variables

Selection

File Handling

Difficulty: **4**

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Python Challenge

25

Challenge 25

You will need to use:



Python Challenge

25

Challenge 25

You will need to use:



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Python Challenge

26

Challenge 26

Write a maths quiz with three questions. It must ask the user to input their name at the start.

At the end it should display a message informing the user of their score.

Write a function that saves the user's name and quiz result in a text file.

You will need to use:

Variables

Selection

Functions

File Handling

Difficulty: 4

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Python Challenge

26

Challenge 26

Write a maths quiz with three questions. It must ask the user to input their name at the start.

At the end it should display a message informing the user of their score.

Write a function that saves the user's name and quiz result in a text file.

You will need to use:

Variables

Selection

Functions

File Handling

Difficulty: 4

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Python Challenge

26

Challenge 26

You will need to use:



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Python Challenge

27

Challenge 27

Extend your maths quiz program from Challenge 20 by including a list of the scores of people that have taken the quiz before.



You will need to use:

Variables

Selection

File Handling

Difficulty: 5

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Python Challenge

27

Challenge 27

Extend your maths quiz program from Challenge 20 by including a list of the scores of people that have taken the quiz before.



You will need to use:

Variables

Selection

File Handling

Difficulty: 5

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Python Challenge

27

Challenge 27

You will need to use:



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Challenge 27

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Python Challenge

28

Challenge 28

Write a random name generator that asks for the user to input 5 names, stores them in an array and then outputs one of them at random.

You will need to use:

Variables

Repetition

Arrays

Difficulty: **5**

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Python Challenge

28

Challenge 28

Write a random name generator that asks for the user to input 5 names, stores them in an array and then outputs one of them at random.

You will need to use:

Variables

Repetition

Arrays

Difficulty: **5**

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Python Challenge

28

Challenge 28

You will need to use:



Python Challenge

28

Challenge 28

You will need to use:



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Python Challenge

29



Challenge 29

Write a program that allows the user to create and store a checklist for a holiday. It should start by asking them the destination of the holiday, how many things they need to pack and how many tasks they need to complete to prepare. The user should then be able to enter each item they need to pack and each task they need to complete.

Difficulty: 5

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You will need to use:

Variables

Repetition

Arrays

File Handling

Challenge 29

Write a program that allows the user to create and store a checklist for a holiday. It should start by asking them the destination of the holiday, how many things they need to pack and how many tasks they need to complete to prepare. The user should then be able to enter each item they need to pack and each task they need to complete.

Difficulty: 5

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You will need to use:

Variables

Repetition

Arrays

File Handling

Python Challenge

29



Challenge 29

You will need to use:

Python Challenge

29



Challenge 29

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Python Challenge

30



Challenge 30

You will need to use:

Improve your maths quick from Challenge 20 and 2Z by storing all the questions and possible answers in a two-dimensional array.

Write a function that can be reused to ask each of the questions.

Global Variables

Repetition

Functions

2D Arrays

Difficulty: **5**

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Python Challenge

30



Challenge 30

You will need to use:

Improve your maths quick from Challenge 20 and 2Z by storing all the questions and possible answers in a two-dimensional array.

Write a function that can be reused to ask each of the questions.

Global Variables

Repetition

Functions

2D Arrays

Difficulty: **5**

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Python Challenge

30



Challenge 30

You will need to use:

Python Challenge

30



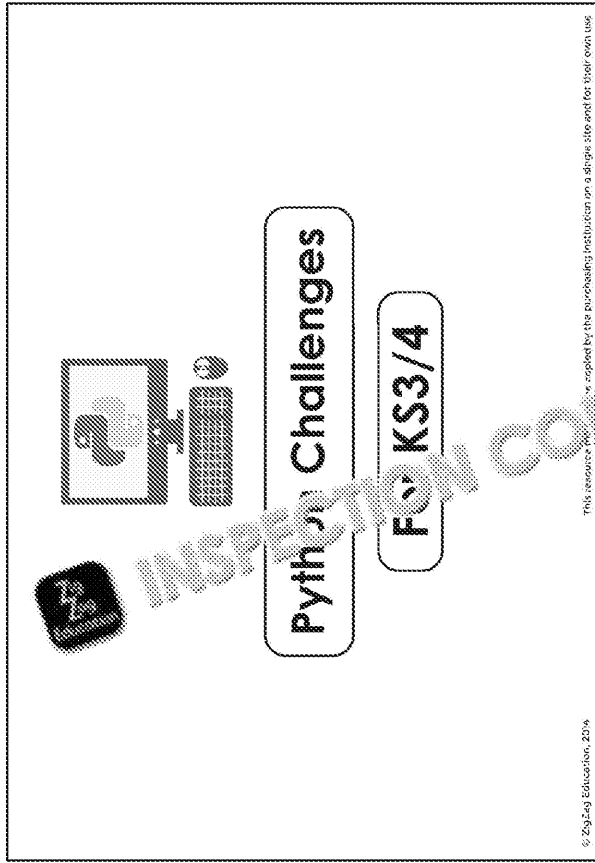
Challenge 30

You will need to use:

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Name: _____

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Python Challenge

1



Challenge 1

Write a program that:

- asks the user to input their age
- outputs 'Your age is: ' followed by their age

You will need to use:

Sequencing

Variables

Difficulty: 1

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★

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Python Challenge

30



Challenge 30

Improve your marks quiz from Challenge 20 and 27 by storing the questions and possible answers in a two-dimensional array.

Write a function that can be reused to ask each of the questions

You will need to use:

Global Variables

Repetition

Functions

2D Arrays

Difficulty: 5

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Python Challenge

29



Challenge 29

Write a program that allows the user to create and store a checklist for a holiday. It should start by asking them for the destination of the holiday, how many things they need to pack and how many tasks they need to complete to prepare. The user should then be able to enter each item they need to pack and which task they need to complete.

You will need to use:

Variables

Repetition

Arrays

File Handling

Difficulty: 5

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Python Challenge

2



Challenge 2

Write a program that:

- asks the user to input two numbers
- calculates the average
- outputs the result

You will need to use:

Sequencing

Variables

Tip: To calculate the average of two numbers you need to add them together and divide them by two.

Difficulty: 1

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Python Challenge

3



Challenge 3

Write a program that:

- asks the user to input the width and height of a rectangle
- calculates the area
- outputs the result

You will need to use:

Sequencing

Variables

Tip: Multiply the width by the height to find the area of a rectangle.

Difficulty: 1

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Python Challenge

28



Challenge 2

Write a random name generator that asks for the user to input 5 names, stores them in an array and then outputs one of them at random.

You will need to use:

Variables

Repetition

Arrays

Difficulty: 5

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Python Challenge

27



Challenge 27

Extend your maths quiz program from Challenge 20 by including a list of the scores of people that have taken the quiz before.

You will need to use:

Variables

Selection

File Handling

Difficulty: 5





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Python Challenge

4



Challenge 4

Write a program that:

- asks the user to input two numbers
- divides the first number by the second number
- outputs the result

You will need to use:

Sequencing

Variables

Difficulty: 1





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Python Challenge

5



Challenge 5

Write a program that:

- asks the user their name
- asks what their favourite subject is (using their name in the question)
- responds to their answer by saying that you like that subject as well

You will need to use:

Sequencing

Variables

Difficulty: 1

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Python Challenge

26



Challenge 26

Write a maths quiz with three questions. It must ask the user to input their name at the start.

At the end it should display a message informing the user of their score.

Write a function that saves the user's name and quiz result in a text file.

You will need to use:

Variables

Selection

Functions

File Handling

Difficulty: 4

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Python Challenge

25



Challenge 25

Write a sign-up program that can ask the user for the following details and store them in a file:

- First Name
- Last Name
- Gender
- Form

You will need to use:

Variables

Selection

File Handling

Difficulty: 4



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Python Challenge

6



Challenge 6

Write a program that:

- asks the user their name
- if it is the same as your name, outputs 'You're cool', otherwise outputs 'Nice to meet you'

You will need to use:

Selection

Variables

Difficulty: 2



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Python Challenge

7



Challenge 7

Write a program that:

- asks the user how long on average they spend watching TV each day
- if it is less than 2 hours, outputs 'That shouldn't rot your brain too much'; if it is less than 4 hours per day, outputs 'Aren't you getting square eyes?'; otherwise outputs 'Fresh air before channel flicking'

Difficulty: **2**

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You will need to use:

Selection

Variables



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Python Challenge

24



Challenge 24

Write a function that takes two numbers.

The first number indicates the number of spaces that should be displayed and the second indicates the number of Xs that should be displayed. They should both be displayed on the same line.

Now write another function that makes multiple calls to your first function and draws a picture with Xs.

Difficulty: **4**

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You will need to use:

Variables

Selection

Repetition

Functions



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Python Challenge

23



Challenge 23

A gardener needs to buy some turf for a project they are working on. The garden is rectangular with a circular flower bed in the middle.

Write a program that:

- asks the user for the dimensions of the lawn and the radius of the circle (in m, as)
- uses a function to calculate and output the amount of turf needed

Tip: Circle area = $\pi \times \text{Radius}^2$

You will need to use:

Variables

Selection

Functions

Difficulty: 4

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★

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Python Challenge

8



Challenge 8

Write a program that:

- converts and outputs marks into grades, using the following data:

Greater than or equal to 75	A
Greater than or equal to 60	B
Greater than or equal to 50	C
Less than 50	D

You will need to use:

Selection

Variables

Difficulty: 2

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Python Challenge

9



Challenge 9

Write a program that:

- asks the user to name one of the Olympic Values (Respect, Excellence and Friendship)
- if they correctly name one, output 'That's correct', otherwise output 'Try again'

You will need to use:

Selection

Variables

Difficulty: 2

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Python Challenge

22



Challenge 22

Write a program that:

- asks the user for the distance (in metres)
- asks the user for the time in seconds that a journey was completed in
- calculates and outputs the average speed using a function

You will need to use:

Variables

Selection

Functions

Difficulty: 3

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Tip: Speed = Distance / Time

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Python Challenge

21



Challenge 21

Write a program that converts between centimetres, and inches and vice versa, by:

- asking the user to input a number
- asking the user to choose between converting from centimetres to inches or from inches to centimetres
- calculating and outputting the result using functions

You will need to use:

Variables

Selection

Functions

Tip: 1 inch = 2.54 cm
1 cm = 0.393700787 inches

Difficulty: 3

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Python Challenge

10



Challenge 10

Write a game that:

- allows the user to play rock, paper, scissors against the computer
- must display the computer's choice and show the result of the game

You will need to use:

Selection

Variables

Tip: The computer's answer must be random.

Difficulty: 2

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Python Challenge

11



Challenge 11

Write a program that:

- asks the user to input a sentence
- calculates and outputs how many characters there are in this sentence

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

20



Challenge 20

Write a program that:

- asks the user to input a number and repeats until they guess the number 7
- congratulate the user with a "Well Done" message when they guess correctly

You will need to use:

Variables

Repetition

Difficulty: **3**

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Python Challenge

19



Challenge 19

Write a program that:

- asks the user to input a number
- outputs the times table for that number
- starts again every time it finishes

You will need to use:

Variables

Repetition

Tip: You must use a For Loop and a While loop for this challenge.

Difficulty: **3**

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Python Challenge

12



Challenge 12

Write a program that:

- asks the user to input a sentence
- outputs the sentence in upper case

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

13



Challenge 13

Write a program that:

- asks the user to input a sentence
- asks the user to input:
 - the word they want to replace
 - the word they want to replace it with
- outputs the new sentence

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

18



Challenge 18

Write a program that:

- asks the user to input a number
- outputs the times table for that number

You will need to use:

Variables

Repetition

Tip: You must use a For Loop in this challenge.

Difficulty: **3**

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Python Challenge

17



Challenge 17

Write a program that:

- outputs all odd numbers between 1 and 99

You will need to use:

Variables

Repetition

Tip: You must use a For Loop for this challenge.

Difficulty: **3**



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Python Challenge

14



Challenge 14

Write a program that:

- asks the user to input a sentence
- outputs the number of times the word 'the' occurs in it

You will need to use:

Variables

String Manipulation

Difficulty: **3**



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Python Challenge

15



Challenge 15

Write a program that:

- asks the user to input a sentence
- outputs the sentence in lower case

You will need to use:

Variables

String Manipulation

Difficulty: **3**

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Python Challenge

16



Challenge 16

Write a program that:

- outputs all numbers between 1 and 10

You will need to use:

Variables

Repetition

Tip: You must use a For Loop in this challenge.

Difficulty: **3**

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Marking



**Suggested Mark Scheme, Marking
and Code Solutions**



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Suggested Mark Scheme

No.	Diff.	1 Point	2 Points
1	x1	The program asks the user to input their age.	The age is outputted.
2	x1	The program asks the user to input two numbers.	The average is calculated and outputted; however, it may not be correct.
3	x1	The program asks the user to input the width and height of a rectangle.	The area is calculated and outputted; however, it may not be correct.
4	x1	The program asks the user to input two numbers.	The program divides the first number by the second number.
5	x1	The program asks the user for their name and their favourite food.	The program asks the user for their favourite food using their name in the question.
6	x2	The program asks the user to input their name.	If the inputted name is the same as the programmer's name, the program outputs 'You're cool'.
7	x2	The program asks the user how long they spend on a computer per day.	If the response is less than 2, it outputs 'That seems reasonable'.
8	x2	The program asks the user to input the student's mark.	The program converts most marks to grades correctly.
9	x2	The program asks the user to input the name of one of the Olympic values.	The program outputs 'That's correct' if they enter a valid Olympic value.
10	x2	The program asks the user to select rock, paper or scissors.	The outcome of the game is correctly calculated.
11	x3	The program asks the user to input a sentence.	The program outputs the number of characters in the sentence.
12	x3	The program asks the user to input a sentence.	The program outputs the original sentence.
13	x3	The program asks the user to input a sentence and the word they want to replace.	The program outputs the original sentence.
14	x3	The program asks the user to input a sentence.	The program counts the number of times 'the' occurs in it.
15	x3	The program asks the user to input a sentence.	The program outputs the original sentence.
16	x3	The program outputs some numbers to the screen.	The program outputs the numbers 1 to 10.

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17	x3	The program outputs some numbers to the screen.	The program outputs some odd numbers.
18	x3	The program asks the user to input a number.	The program outputs the time table for the inputted number.
19	x3	The program asks the user to input a number.	The program outputs the times table for the number given.
20	x3	The program asks the user to guess the number.	If they input the number 7, the program will output 'Well Done'.
21	x3	The program asks the user to choose the type of the conversion they want to carry out and to input the number they want to convert.	The program correctly converts between inches and centimetres.
22	x3	The program asks the user to input the distance and time.	The program correctly calculates the average speed.
23	x4	The program asks the user to input the dimensions of the lawn and the radius of the circle.	The program correctly calculates the amount of turf required.
24	x4	The program displays a number of spaces followed by a number of Xs on the same line.	The program uses a function to output a set number of spaces and Xs on the same line.
25	x4	The program asks the user to input their First Name, Last Name, Gender and Form.	The data is stored in an external text file.
26	x4	The program asks the user to input their name and then asks three maths questions.	At the end of the questions the program displays the user's name followed by their score.
27	x5	The program opens an external file.	The program loads the scores from an external file.
28	x5	The program asks the user to input 5 names.	The program stores the names in an array.
29	x5	The program asks the user for the destination of their holiday, how many things they need to pack and how many tasks they need to complete.	The program should use a for loop to ask the user to input each item they need to pack and each task they need to complete.
30	x5	An attempt has been made to make a two-dimensional array.	The program uses a two-dimensional array to store the questions and answers for a quiz.

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Marking Grid

Name.....

No.	Points Won	Difficulty Multiplier	My Points	
1	1 ☐ 2 ☐ 3 ☐	x1	/ 3	
2	1 ☐ 2 ☐ 3 ☐	x1	/ 3	
3	1 ☐ 2 ☐ 3 ☐	x1	/ 3	
4	1 ☐ 2 ☐ 3 ☐	x1	/ 3	
5	1 ☐ 2 ☐ 3 ☐	x1	/ 3	
6	1 ☐ 2 ☐ 3 ☐	x2	/ 6	
7	1 ☐ 2 ☐ 3 ☐	x2	/ 6	
8	1 ☐ 2 ☐ 3 ☐	x2	/ 6	
9	1 ☐ 2 ☐ 3 ☐	x2	/ 6	
10	1 ☐ 2 ☐ 3 ☐	x2	/ 6	
11	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
12	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
13	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
14	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
15	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
16	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
17	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
18	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
19	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
20	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
21	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
22	1 ☐ 2 ☐ 3 ☐	x3	/ 9	
23	1 ☐ 2 ☐ 3 ☐	x4	/ 12	
24	1 ☐ 2 ☐ 3 ☐	x4	/ 12	
25	1 ☐ 2 ☐ 3 ☐	x4	/ 12	
26	1 ☐ 2 ☐ 3 ☐	x4	/ 12	
27	1 ☐ 2 ☐ 3 ☐	x5	/ 15	
28	1 ☐ 2 ☐ 3 ☐	x5	/ 15	
29	1 ☐ 2 ☐ 3 ☐	x5	/ 15	
30	1 ☐ 2 ☐ 3 ☐	x5	/ 15	

Total: /

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Code Solutions

Challenge 1

```
#!/usr/bin/python3

#Asks the user to input their name and stores it in the age variable
age=input("What is your age? ")
#Outputs the contents of the age variable to the screen
print ("Your age is:",age)
```

Challenge 2

```
#!/usr/bin/python3

print ("----AVERAGE CALCULATOR----")

#Asks the user to enter two numbers and stores them in the num1 and num2 variables
num1=int(input("Enter your first number: "))
num2=int(input("Enter your second number: "))

#Calculates the average of the two numbers
average=(num1+num2)/2

#Outputs the value stored in the average variable to the screen
print ("The average is:",str(average))
```

Challenge 3

```
#!/usr/bin/python3

print ("----AREA CALCULATOR----")

#Asks the user to input the width and height and stores them in the width and height variables
width=int(input("Enter the width: "))
height=int(input("Enter the height: "))

#Calculates the area and stores it in the area variable
area=width*height

#Outputs the value stored in the area variable to the screen
print ("The area is:",str(area))
```

Challenge 4

```
#!/usr/bin/python3

print ("----DIVIDER----")

#Asks the user to input two numbers and stores them in two variables
num1=int(input("Enter your first number: "))
num2=int(input("Enter your second number: "))

#Divides the value in the num1 variable by the value in the num2 variable
result=num1/num2

#Outputs the value stored in the result variable to the screen
print ("The result is:",str(result))
```

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Challenge 5

```
#!/usr/bin/python3

#Asks the user to input their name and stores it in a variable
name=input("Enter your name: ")

#Asks the user to input their favourite subject, using the variable in the question
subject=input("What is your favourite subject "+name+"? ")

#Outputs the value stored in the food variable
print ("I like",subject,"as well!")
```

Challenge 6

```
#!/usr/bin/python3

#Asks the user to input their name and stores it in a variable
name=input("Enter your name: ")

#Asks the user a question: is the value in name equal to "Bob"?
if name=="Bob":
    #If the answer to the question is yes this line is output
    print ("You're cool")
else:
    #Otherwise this line is outputted
    print ("Nice to meet you")
```

Challenge 7

```
#!/usr/bin/python3

#Asks the user to input a value and stores it in the time variable
time=int(input("How many hours on average do you spend watching TV each week? "))

#If statement that outputs different strings depending on the value of the time variable
if time<2:
    print ("That shouldn't rot your brain too much")
elif time<4:
    print ("Aren't you getting square eyes?")
else:
    print ("Fresh air beats channel flicking")
```

Challenge 8

```
#!/usr/bin/python3

print ("----GRADE CALCULATOR----")

#Asks the user to input a mark and stores it in the mark variable
mark=int(input("Enter your mark: "))

#If statement that outputs different strings depending on the value in the mark variable
if mark>=75:
    print ("Grade: A")
elif mark>=60:
    print ("Grade: B")
elif mark>=35:
    print ("Grade: C")
else:
    print ("Grade: D")
```

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Challenge 9

```
#!/usr/bin/python3

#Asks the user to input one of the Olympic Values and stores
value=input("Name one of the Olympic Values: ")

#Outputs different strings depending on whether the user correctly
#entered the name of an Olympic Value
if value=="respect" or value=="excellence" or value=="friends":
    print ("That's correct")
else:
    print ("Try again")
```

Challenge 10

```
#!/usr/bin/python3

print ("----ROCK, PAPER, SCISSORS----")

import random

#generates a random number between 1 and 3
computer=random.randint(1,3)

#asks the user to input their choice and stores it in a variable
user=int(input("Enter your choice:\n1=Rock\n2=Paper\n3=Scissors\n"))

#outputs the computer's move
print("The computer has chosen",computer)

#outputs a different string depending on the outcome of the game
if computer==user:
    print ("Tie game")
elif computer==1 and user==3:
    print ("Computer wins")
elif computer==2 and user==1:
    print ("Computer wins")
elif computer==3 and user==2:
    print ("Computer wins")
else:
    print ("You Win!")
```

Challenge 11

```
#!/usr/bin/python3

#asks the user to input a sentence and stores it in the text variable
text=input("Enter your sentence: ")

#outputs the number of characters on the screen
print ("There are",len(text),"characters")
```

Challenge 12

```
#!/usr/bin/python3

#asks the user to input a sentence and stores it in the text variable
text=input("Enter your sentence: ")

#outputs the sentence in upper case
print (text.upper())
```

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Challenge 13

```
#!/usr/bin/python3
```

```
#asks the user to input a sentence and stores it in the text
text=input("Enter your sentence: ")
word1=input("Enter the word you want to replace: ")
word2=input("Enter the word you want to replace it with: ")
```

```
#outputs the sentence with the original word replaced with the
print (text.replace(word1,word2))
```

Challenge 14

```
#!/usr/bin/python3
```

```
#asks the user to input a sentence and stores it in the text
text=input("Enter your sentence: ")
```

```
#outputs the number of times "the" occurs in the sentence
print ("The word 'the' appears",text.count("the"),"times")
```

Challenge 15

```
#!/usr/bin/python3
```

```
#asks the user to input a sentence and stores it in the text
text=input("Enter your sentence: ")
```

```
#outputs the sentence in lower case
print (text.lower())
```

Challenge 16

```
#!/usr/bin/python3
```

```
#a loop that outputs numbers from 1 to 10
for x in range(1,11):
    print(x)
```

Challenge 17

```
#!/usr/bin/python3
```

```
num=1
```

```
#a loop that outputs the odd numbers from 1 to 100
for x in range(0,50):
    print(num)
    num=num+2
```

Challenge 18

```
#!/usr/bin/python3
```

```
print ("-----TIMES TABLE GENERATOR-----")
```

```
#asks the user to input a number
num=int(input("Enter a number: "))
```

```
#this loop generates the times table for the number stored in
for x in range(0,10):
    print (str((x+1)*num))
```

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Challenge 19

```
#!/usr/bin/python3

print ("-----TIMES TABLE GENERATOR-----")

#a loop that will continually repeat the program
while True:
    #asks the user to input a number and stores it in the num
    num=int(input("\nEnter a number: "))

    #a loop that outputs the times table for the number store
    for x in range(0,10):
        print (str((x+1)*num))
```

Challenge 20

```
#!/usr/bin/python3

print ("-----GUESS THE NUMBER-----")

guess=0

#Loops until the user guesses the number 7
while guess!=7:
    guess=int(input("Enter your guess: "))
    if guess!=7:
        print("Incorrect... guess again")

print ("Well done!")
```

Challenge 21

```
#!/usr/bin/python3

print ("-----INCHES/CM CONVERTER-----")

#Converts inches to cm
def intocm(n):
    convert=n*2.54
    print(n,"inches =",convert,"cm")
    return

#Converts cm to inches
def cmtoin(n):
    convert=n*0.393700787
    print(n,"cm =",convert,"inches")
    return

#Asks the user to input a number and select the type of conversion
num=int(input("Enter the number you want to convert: "))
unit=int(input("Choose an option: 1-INCHES to CENTIMETRES\n2-CENTIMETRES to INCHES\n"))

#If statement to call the appropriate function
if unit==1:
    intocm(num)
elif unit==2:
    cmtoin(num)
```

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Challenge 22

```
#!/usr/bin/python3

print ("-----AVERAGE SPEED CALCULATOR-----")

#Function to calculate average speed
def calculate(d,t):
    speed=d/t
    print("The average speed is:",speed,"m/s")
    return

#User input of distance and time
distance=int(input("Enter the distance travelled in metres: "))
time=int(input("Enter the time it took to complete the journey: "))

#Calls the calculate function, passing the distance and time
calculate(distance,time)
```

Challenge 23

```
#!/usr/bin/python3
import math

print ("-----TURF CALCULATOR-----")

#Function to calculate the amount of turf required
def calculate(w,l,r):
    lawnArea=w*l
    bedArea=math.pi*r*r
    turf=lawnArea-bedArea
    print("You need",turf,"square metres of turf")
    return

#User input of width and length of the lawn and the radius of
width=int(input("Enter the width of the lawn: "))
length=int(input("Enter the length of the lawn: "))
radius=int(input("Enter the radius of the flower bed: "))

#Calls the calculate function, passing the width, length and
calculate(width,length,radius)
```

Challenge 24

```
#!/usr/bin/python3

#Function to draw a line of the image
def drawLine(s,x):
    for i in range(0,s):
        print(" ", end=""),
    for i in range(0,x):
        print("X", end="")
    print()
    return

#Function to call the drawLine function to draw an image
def drawPicture():
    drawLine(5,1)
    drawLine(4,3)
    drawLine(3,5)
    drawLine(2,7)
    drawLine(1,9)
    drawLine(4,3)
    drawLine(4,3)
    return

drawPicture()
```

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Challenge 25

```
#!/usr/bin/python3

print("-----CLUB SIGN UP-----")

#User enters their details
first=input("Enter your first name: ")
last=input("Enter your last name: ")
gender=input("Enter your gender: ")
form=input("Enter your form: ")

#Opens the file or creates it if it doesn't already exist
file = open("signup.txt", "a")
#Records the user's details in the file
file.write("\nFirst name: "+first+", Last name: "+last+", Gender: "+gender+", Form: "+form)
#Closes the file
file.close()
```

Challenge 26

```
#!/usr/bin/python3

def saveScore(n,s):
    #Opens the file or creates it if it doesn't already exist
    file = open("scores.txt", "a")
    #Records the user's score in the file
    file.write("Name: "+n+", Score: "+str(s)+"\n")
    #Closes the file
    file.close()
    return

print("-----MATHS QUIZ-----")

#Variable setup
name=input("Enter your name: ")
score=0

#Question 1
answer=int(input("What is 3 x 5?: "))
if answer==15:
    score=score+1

#Question 2
answer=int(input("What is 10 + 13?: "))
if answer==23:
    score=score+1

#Question 3
answer=int(input("What is 10 / 2?: "))
if answer==5:
    score=score+1

#Prints the score on the screen
print("Your score is: ",score)

#Calls the saveScore function and passes the name and score v
saveScore(name,score)
```

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Challenge 27

```
#!/usr/bin/python3

def saveScore(n,s):
    #Opens the file or creates it if it doesn't already exist
    file = open("scores.txt", "a")
    #Records the user's score in the file
    file.write("Name: "+n+", Score: "+str(s)+"\n")
    #Closes the file
    file.close()
    return

print("----MATHS QUIZ----\n")

print("----SCORES----")
#Creates the scores.txt file if it doesn't exist
file = open("scores.txt", "a")
file.close()
#Opens the file in read-only mode
file = open("scores.txt", "r")
#Loop that prints each line from the file to the screen
for line in file:
    print(line)

#Variable setup
name=input("Enter your name: ")
score=0

#Question 1
answer=int(input("What is 3 x 5?: "))
if answer==15:
    score=score+1

#Question 2
answer=int(input("What is 10 + 13?: "))
if answer==23:
    score=score+1

#Question 3
answer=int(input("What is 10 / 2?: "))
if answer==5:
    score=score+1

#Calls the saveScore function and passes the name and score v
saveScore(name,score)
```

Challenge 28

```
#!/usr/bin/python3
import random
print("----RANDOM NAME GENERATOR----")

#Creates an empty array
names=[]

#Asks the user to enter 5 names and adds them to the array
for i in range(1,6):
    names.append(input("Enter name "+str(i)+"?: "))

#Generates a random number between 1 and 5
num=random.randint(0,5)

#Outputs the randomly chosen name
print(names[num],"has been chosen")
```

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Challenge 29

```
#!/usr/bin/python3

print("-----HOLIDAY CHECKLIST-----")

#Creates the empty arrays
packList=[]
tasks=[]

#Asks the user to input the holiday info
name=input("Enter the destination of the holiday: ")
itemsNum=int(input("Enter the number of items you need to pack: "))
tasksNum=int(input("How many tasks do you need to complete to get ready: "))

#Loop to store the packing list
for i in range(0,itemsNum):
    packList.append(input("Enter the name of item "+str(i+1)+": "))

#Loop to store the tasks
for i in range(0,tasksNum):
    tasks.append(input("Enter task "+str(i+1)+": "))

#Stores the checklist in a file
file = open((name+" checklist.txt"), "w")
file.write("Destination: "+name+"\nPacking List: \n")
for item in packList:
    file.write(item+"\n")
file.write("Tasks: \n")
for item in tasks:
    file.write(item+"\n")
file.close()
print("Your list has been saved")
```

Challenge 30

```
#!/usr/bin/python3

#Function that can be used to ask each question
def ask(q,s):
    answer=int(input(questions[0][q]))
    if answer==questions[1][q]:
        s=s+1
    return s

print("----MATHS QUIZ----\n")

print("----SCORES----")
#Creates the scores.txt file if it does not exist
file = open("scores.txt", "a")
file.close()
#Opens the file in read-only mode
file = open("scores.txt", "r")
#Loop that prints each line from the file to the screen
for line in file:
    print(line)
file.close()

#Variable setup
name=input("Enter your name: ")
score=0
questions=["What is 3 x 5?: ", "What is 10 + 13?: ", "What is 100 - 12?: ", "What is 4 x 7?: ", "What is 15 + 20?: "]
...

```

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...

```
#Loop to call ask function to ask each question
for i in range(len(questions)+1):
    score=ask(i,score)

#Opens the file in append mode
file = open("scores.txt", "a")
#Prints the score to the screen
print("Your score is:",score)
#Records the user's score in the file
file.write("Name: "+name+", Score: "+str(score)+"\n")
#Closes the file
file.close()
```



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