

More Challenges

These challenges should only be attempted after difficulty ******* challenges have been successfully completed in all the required objectives.

Word extractor challenge

Difficulty: ********

Requires knowledge of objectives 1-3

Write a program that outputs the sentence: Quick brown fox jumps over the lazy dog. The user can then enter the word to be cut from the sentence. The sentence is then output with the word removed.

Hours worked challenge

Difficulty: ********

Requires knowledge of objectives 1-4

Write a program that asks the user for the number of hours worked this week and their hourly rate of pay. The program should calculate the gross pay. If the number of hours worked is greater than 40, the extra hours are paid at 1.5 times the rate. The program should display an error message if the number of hours worked is not in the range 0 to 60.

ROT13 challenge

Difficulty: ********

Requires knowledge of objectives 1-6

ROT13 is a simple letter substitution cipher that replaces a letter with the letter 13 letters after it in the alphabet. ROT13 is a special case of the Caesar cipher, developed in ancient Rome. ROT13 is used in online forums as a means of hiding spoilers, punchlines and puzzle solutions from the casual glance. Create a program that allows the user to enter plain text, and the ROT13 cipher is output. Extend the program to allow cipher text to be input, with the plain text output.

Letter game challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-6

A word game awards points for the letters used in a word. The lower the frequency of the letter in the English language, the higher the score for the letter. Write a program that asks the user to input a word. The program should then output the score for the word according to the following rules:

Letter	Points	Letter	Points
E	1	M	14
A	2	H	15
R	3	G	16
I	4	B	17
O	5	F	18
T	6	Y	19
N	7	W	20
S	8	K	21
L	9	V	22
C	10	X	23
U	11	Z	24
D	12	J	25
P	13	Q	26

Change calculator

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-7

Write a program that outputs the change to be given by a vending machine using the lowest number of coins. E.g. £3.67 can be dispensed as 1x£2 + 1x£1 + 1x50p + 1x10p + 1x5p + 1x2p.

Parser challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-8

Write a program that allows the user to enter an addition in the format: 16+8. There may be any number of digits and additions in the input string. E.g. 16.4+108+9 is also a valid input. The parser should be a function that returns the answer.

Blackjack challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-8

Create a program that plays a game of Blackjack between the player and computer. The program should:

- Deal two cards to the player and computer. One of the dealers cards is shown face up. All other cards are dealt face down.
- Cards 2-10 are face value. All picture cards are 10. Ace is 1 or 11, player may choose.
- Once the card have been dealt ask the user if they want to twist or stick.
- If the user twists then a new card is dealt and that is added to their total.
- If the player busts (goes over 21) the dealer wins.
- Once the player sticks, the dealer turns over his card and may twist or stick.
- The player or dealer cannot stick below 16.
- If the dealer busts then the player wins.
- If both players stick, the player closest to 21 wins.

Lottery challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-8

In a lottery, players pick 6 numbers between 1 and 59. Six unique random balls are then output, together with a "bonus ball". Prizes are awarded for matching 2, 3, 4, 5, 5 and the bonus ball or 6 numbers. Write a program to simulate the National Lottery, outputting from 1,000,000 draws how many times the player won each of the prizes. Use your program to prove the odds of winning the jackpot of 6 numbers is 1 : 45,057,474.

Pass the Pigs challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-8

Pass the pigs is a game where a player tosses two plastic pigs and scores points according to how they land. If the two pigs land on the same side, that is known as a 'sider' and the player scores 1 point. If one pig lands on its feet, this is known as a 'trotter' and the player scores 5 points. Both pigs landing on their feet is a 'double trotter' and scores 20 points. After each throw the player can throw again to increase their score. However, if both pigs land on opposite sides that is a 'pig out' and the player's score is reset to 0. The player attempts to score 100 points or more in as few throws as possible.

Pseudocode
1.0 Set player's score to be 0
2.0 Loop while the player's score is less than 100
2.1 Wait for the user to press enter
2.2 Output a blank line
2.3 PigA is a random number between 1 and 3
2.4 PigB is a random number between 1 and 3
2.5 Check if PigA and PigB land on the same side
2.5.1 Output 'sider' – 1 point
2.5.2 Increase player's score by 1
2.6 Check if PigA and PigB both land on the other side
2.6.1 Output 'sider' – 1 point
2.6.2 Increase player's score by 1
2.7 Check if PigA and PigB land on the opposite sides
2.7.1 Output 'pig out' – back to 0 points
2.7.2 Set player's score to 0
2.8 Check if PigA and PigB land on the opposite sides other way
2.8.1 Output 'pig out' – back to 0 points
2.8.2 Set player's score to 0
2.9 Check if PigA but not PigB lands on its feet
2.9.1 Output 'trotter' – 5 points
2.9.2 Increase player's score by 5
2.10 Check if PigB but not PigA lands on its feet
2.10.1 Output 'trotter' – 5 points
2.10.2 Increase player's score by 5
2.11 Check if PigA and PigB both land on their feet
2.11.1 Output 'double trotter' – 20 points
2.11.2 Increase player's score by 20
2.12 Output player's score

Pass the Pigs challenge part 2

Include these additional point scores:

Snouter	Pig lands on its nose	5 points
Double Snouter	Both pigs land on their nose	20 points
Razorback	Pig lands on its back	5 points
Double Razorback	Both pigs land on their back	20 points

The game is now unbalanced because it is easier to score points than to pig out or score a sider. Change the balance of the game so it remains a challenge. Generate a higher random number and use a greater or lesser range of numbers to represent each position.

Pass the Pigs challenge part 3

Create a two player version of the game where players can choose to bank after each throw, giving their opponent a chance to throw. Players can continue their go until they pig out or choose to bank. The first to 100 banked points wins.

Research the full range of scores available in the real game 'pass the pigs'. Include these in your game with an appropriate balance of probability.

Battleships challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-9

Battleships is a game for two players. Each player places four ships on a board but does not reveal their location to their opponent. Each ship occupies one or more adjacent squares either horizontally or vertically. Each player takes it in turn to pick a grid reference. The player scores a hit if the number matches a space occupied by a ship, or a miss if it does not. The player to sink all their opponents ships first wins.

	0	1	2	3	4	5	6	7	8	9
0										
1		1				2	2			
2										
3										
4						3				
5						3				
6						3				
7										
8		4	4	4	4					
9										

- Create a one player game of battleships against a computer opponent.
- Keep score to tell the player how many hits and misses they have had.

Battleships challenge part 2

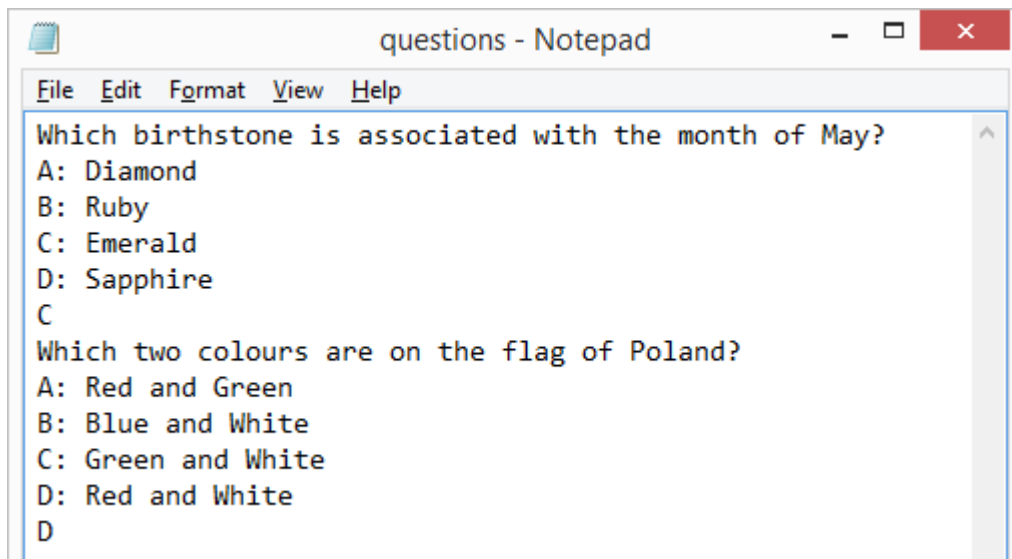
The computer chooses indexes to fire at more methodically. If one index is a hit then it should fire at the one before or the one after next until the ship is sunk.

Quiz challenge

Difficulty: ❌❌❌❌

Q10 is a simple quiz game. Ten random questions are presented to the player one at a time, together with 4 possible answers. The player has to choose which answer: A, B, C or D is correct. The computer outputs the correct answer after the player has answered.

Create the following sample quiz file containing two questions in Notepad and save it in a folder for your new quiz program. Make sure you name it questions.txt



```
File Edit Format View Help
Which birthstone is associated with the month of May?
A: Diamond
B: Ruby
C: Emerald
D: Sapphire
C
Which two colours are on the flag of Poland?
A: Red and Green
B: Blue and White
C: Green and White
D: Red and White
D
```

Note the file contains the question, the four possible answers followed by the correct answer. Create the quiz program to use this file.

- The program outputs if the user got the question right or wrong.
- The program keeps score and outputs the score to the user.
- Modify the program to work for ten questions. Use a loop to show the questions one at a time, you don't need to duplicate the code!
- The program shows the question number 1-10.
- The player is only allowed to answer the next question if they got the previous one correct. When an incorrect answer is given the quiz ends.
- The program picks a random set of questions stored in different files.
- The program prevents an illegal data entry. Only characters A-D are accepted.

Till challenge

Difficulty: ❌❌❌❌

Using the product catalogue program, create a program to meet the following specification:

1. A till can be put into 'admin' or 'trading mode'.
2. In the trading mode, the user can perform the following operations:
 - a. Enter a product code. The product is found and the description and price is displayed.
 - b. The price of the product is added to a sub-total.
 - c. When a product code is not entered, the total is shown.
 - d. The user enters how much money was given and the change is shown.
 - e. A new set of transactions then begins.
3. In the admin mode, the user can perform the following operations:
 - a. View the product catalogue
 - b. Add a new product
 - c. Edit a product
 - d. Delete a product

London Underground challenge

Difficulty: ❌❌❌❌

Requires knowledge of objectives 1-9

The only station on the London Underground that can be formed without using any of the letters in the word mackerel is St John's Wood. This is also true for the words piranha and sturgeon, although for different stations.

For a given list of stations, write a program that takes a word and determines if there is a single station that can be formed without using any of its letters.