

Solutions

11+ Familiarisation Questions

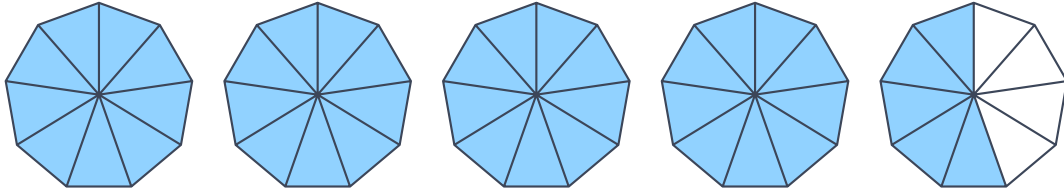
Contents

- Maths** **3**
- Non-Verbal Reasoning** **6**
- English** **9**
- Verbal Reasoning** **12**
- Puzzles and Problem Solving** **15**
- Creative Comprehension** **18**

Maths

Maths

What is $4\frac{5}{9}$ as an improper fraction? Use the diagram below to help you.



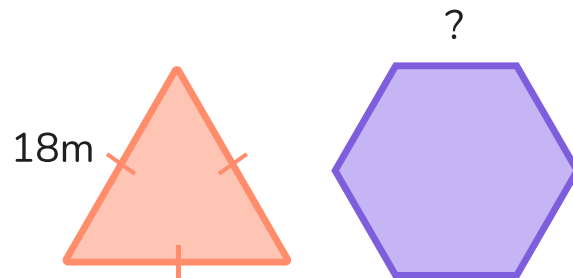
- A $\frac{45}{9}$ B $\frac{16}{3}$ C $\frac{20}{9}$ D $1\frac{32}{9}$ E $\frac{41}{9}$

Explanation

- We need to convert $4\frac{5}{9}$ into an improper fraction (a fraction whose **numerator** is bigger than its **denominator**):
 - multiply the **whole number** by the **denominator**
$$4 \times 9 = 36$$
 - add this **result** to the original **numerator** to get the **numerator** of our improper fraction
$$36 + 5 = 41$$
 - put this new numerator over the original **denominator** to get the answer, $\frac{41}{9}$.
- We can check that this answer is right by using the image. It has 41 shaded segments in total, and each shape is split into 9 equal segments. So, our answer looks correct!

Maths

These two shapes have equal perimeters. What is the length of one side of the regular hexagon?



- A 6 m B 7 m C 8 m D 9 m E 10 m

Explanation

- From the image, we know that the first shape is an **equilateral triangle** and that each of its sides measures 18 m.
- We can now work out the **perimeter** of the **triangle** by multiplying 18 m by 3:

$$18 \text{ m} \times 3 = 54 \text{ m}$$

- Now, we can calculate the length of one of the **regular hexagon's** side by dividing 54 m (its total perimeter) by 6 (the number of sides).

$$54 \text{ m} \div 6 = 9 \text{ m}$$

Maths

Cauldrons cost £22 each and crystal balls cost £60 each. Wilhelm bought a mixture of these items and spent exactly £400.

How many crystal balls did he buy?

- A 2 B 3 C 4 D 5 E 6

Explanation

- We need to find the number of **crystal balls** that Wilhelm bought. We know that Wilhelm spent £400 in total, and a crystal ball costs **£60**, so it is helpful to list the multiples of 60 up to 400:
 - **Multiples of 60**: 60, 120, 180, 240, 300, 360
- One of the above numbers must be the total amount that Wilhelm spent on **crystal balls**. We can use these numbers to work out how much Wilhelm spent on **cauldrons** by adding them to a multiple of **£22** to get £400.
 - **Multiples of 22**: 22, 44, 66, 88, 110, 132, 154, 176, 198, 220...
- **£220** in cauldrons + **£180** in crystal balls = £400, so Wilhelm must have bought **3 crystal balls**. B is correct!

Non-Verbal Reasoning

Non-Verbal Reasoning

Identify the code which applies to the final shape.

Explanation

- To work out what each letter of the code represents, we have to **compare** any images that **share a letter in the same position**, i.e. they have the same top or bottom letter.

Top Letter:

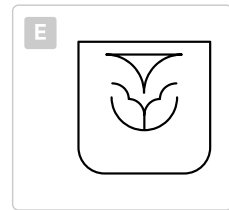
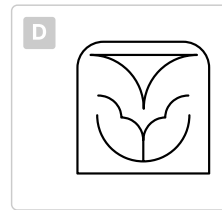
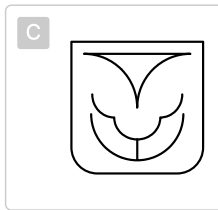
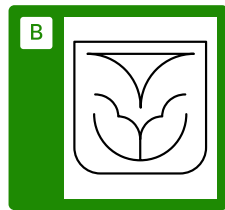
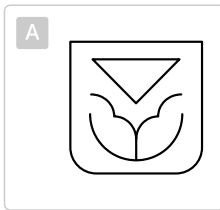
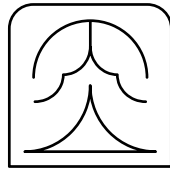
- The second and third images both have 'Z' in their codes. These images have two things in common:
 - they both contain **four shapes**
 - they both are a **grey colour**
- The fourth image also contains four shapes, but it has 'Y' as its top letter, not 'Z'. From this, we can deduce that **the top letter codes for the feature of colour**.
- Our final image is **white**, so it must have the same top letter as the first image, 'X'.

Bottom Letter:

- 'A' appears in the code for the first and fourth images. They both contain the same shape: **triangles**. We now know that **the bottom letter codes for the type of shape**.
- Our final image contains **diamonds** so the bottom letter must be 'B', like in the third image.

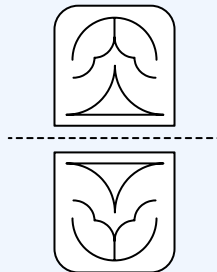
Non-Verbal Reasoning

Select the image that is a reflection of the main image.



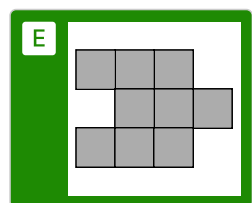
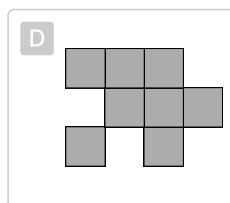
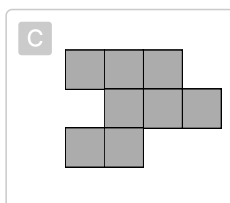
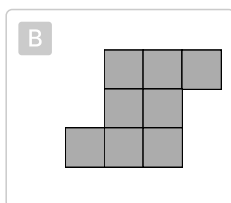
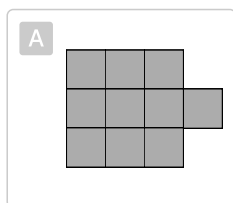
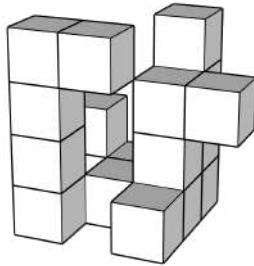
Explanation

- We can rule out...
 - A because the main image contains a **curved triangle**, not a triangle with three straight lines.
 - C because the middle line is a **different shape** from the original image.
 - D because the outer shape **has not been reflected**.
 - E because the inner lines are much **smaller** than in the main image.
- The correct answer is B. It is a reflection of the main image across a **horizontal line**.



Non-Verbal Reasoning

What does this 3D shape look like from above?



Explanation

- There are **3 top blocks** in the **front row** of the shape.
 - We can rule out D because it is missing the **overhanging block** in the middle.
 - We can rule out C because it is missing the **rightmost block** on the bottom storey.
- There are **3 top blocks** in the **middle** row of the shape.
 - We can rule out A because there should be a **gap** in the leftmost position.
 - We can rule out B because there is an **overhanging block** in the rightmost position.
- There are **3 top blocks** in the **back** row too.
- The correct answer is E.

English

English

Extract from 'The Voyage of the Beagle'

by Charles Darwin

The tortoise is very fond of water, drinking large quantities, and wallowing in the mud. The larger islands alone possess springs, and these are always situated towards the central parts, and at a considerable height. The tortoises, therefore,

- 5 which frequent the lower districts, when thirsty, are obliged to travel from a long distance. Hence broad and well-beaten paths branch off in every direction from the wells down to the sea coast; and the Spanish sailors, by following them up, first discovered the watering places. When I landed at
- 10 Chatham Island, I could not imagine what animal travelled so methodically along well-chosen tracks.

Near the springs it was a curious spectacle to behold many of

What is meant by '**frequent**', as used on line 5?

- A to belong to
- B to visit regularly
- C recurring
- D common
- E to reside in

Explanation

- The correct answer is B.
- In line 5, '**frequent**' is a **verb** meaning '**to visit regularly**'. It is pronounced with a stress on the second syllable, as in freQUENT.
- '**Frequent**' (pronounced FREquent) can also be an **adjective** meaning '**repeated, continual**', as in 'the tortoises made **frequent** visits to the lower districts'. However, this is **not** how 'frequent' is used in the text, so we can rule out C and D.

English

Choose the **best** word to complete this sentence.

Finneas took considerable _____ in the latest developments in space exploration.

- A care B influence C interest D involvement E dedicate

Explanation

- The correct answer is '**interest**'.
- In this sentence, '**interest**' is a **noun** meaning 'a desire to learn more about something'.
- '**Interest**' can also be a **verb**, as in 'space travel really **interests** me'.

English

The sentence below may contain a **spelling** mistake.

Select the group of words with the mistake in it. If there is no mistake, select 'None'.

The manager will try her hardest to accomodate your request.

A

B

C

D

- A A B B C C D D E None

Explanation

- There is a spelling mistake in C. There should be two **m**'s in the word '**accommodate**'.
- In this sentence, '**accommodate**' means '**to fulfil someone's wishes or needs.**' '**Accommodate**' can also mean '**to provide lodging for**'.
- '**Accommodate**' has two sets of double letters. One way you can try to remember this is:
'Accommodate' is large enough to accommodate **two c's** and **two m's**.

Verbal Reasoning

Verbal Reasoning

Select two words, one from each set of brackets, that can be joined together to form a new word.

(exam, ignore, deter) (race, mine, ant)

A exam B ignore C deter D race E mine F ant

Explanation

- '**Deter**' and '**mine**' can be joined together to form the word '**determine**'.
- 'Determine' is a verb meaning 'to decide' or 'to find out'. For example, 'the winner is determined by a vote'.
- Watch out! You may have been tempted to join together '**deter**' and '**ant**' to form '**deterant**'. Although this sounds very similar to 'deterrent', it is not a real word.

Verbal Reasoning

Select the two words, one from each group, that are the closest in meaning.

warning, drowsy, cautious | **dormant, wary, thorough**

A warning B drowsy C cautious D dormant E wary F thorough

Explanation

- The correct answers are '**cautious**' and '**wary**'. Both of these words are **adjectives** that mean 'careful'.
- **Watch out!** The word '**dormant**' means 'asleep', whereas '**drowsy**' means 'slightly sleepy'. Therefore, although they are similar, they do not have the same meaning!

Verbal Reasoning

Cornelia Street contains five houses in a row, numbered 1 to 5. Each house only has one person living in it.

Alfie, Bilkisu, Caitlin, Daika and Enzo all live on Cornelia Street.

Alfie has two next-door neighbours, Enzo and Daika.

Bilkisu only has one next-door neighbour.

Caitlin lives in the last house on the street, next to Daika.

Who lives at 2 Cornelia Street?

- A Alfie B Bilkisu C Caitlin D Daika E Enzo

Explanation

- The correct answer is **Enzo**.
- From the first statement, we can deduce that **Enzo**, **Alfie** and **Daika** all live in a row.
- From the second statement, we can figure out that **Bilkisu** must live at either 1 or 5 Cornelia Street because she only has one next-door neighbour.
- From the third statement, we know that **Caitlin** lives at 5 Cornelia Street and **Daika** lives at 4 Cornelia Street.
- This means that **Bilkisu** must live at 1 Cornelia Street, **Enzo** must live at 2 Cornelia Street and **Alfie** must live at 3 Cornelia Street.



Puzzles and Problem Solving

Puzzles and Problem Solving

The difference between two four-digit numbers is 5555.

Which number fills the gap indicated by the question mark?

- A 1
 B 2
 C 3
 D 7
 E 9

Drag and drop the numbers to complete the column subtraction.

6	7	8	9
-	1	2	3
5	5	5	5

Reset

Explanation

- To fill all of the gaps, we need to **rearrange each column** into a calculation that we can solve.

Ones: $? - 4 = 5$ becomes $5 + 4 = ?$, so the missing digit is **9**.

Tens: $8 - ? = 5$ becomes $8 - 5 = ?$, so the missing digit is **3**.

Hundreds: $? - ? = 5$ contains **two unknowns**, so we will leave this for now.

Thousands: $6 - ? = 5$ becomes $6 - 5 = ?$, so the missing number is **1**.

$$\begin{array}{r}
 6 \ 7 \ 8 \ 9 \\
 - 1 \ 2 \ 3 \ 4 \\
 \hline
 5 \ 5 \ 5 \ 5 \\
 \hline
 \end{array}$$

- To complete the **hundreds** column, we need to look at the **remaining digits** and think about whether they can be subtracted from one another to get 5.
- $? - ? = 5$ becomes $7 - 2 = 5$, so the number we are looking for is **2**.

Puzzles and Problem Solving

Create a path between each shape and its number of vertices.

Paths cannot cross and no square in the grid can be left blank.

Which shape's path has more than one corner?

- A cube B cylinder C tetrahedron
 D triangular prism E cone

Drag the tiles into the grid to create a path.

			4		
8			6		
0			1		

Reset

Explanation

- To answer this question, we must create a path between each **3D shape** and its **number of vertices**. Remember, '**vertices**' is another word for the **corners of a shape**.
 - A **cube** has **8** vertices
 - A **cylinder** has **0** vertices
 - A **tetrahedron** has **4** vertices
 - A **triangular prism** has **6** vertices
 - A **cone** has **1** vertex
- The **path** connecting the **triangular prism** to the number '**6**' has **two corners**, so this is our answer!

Puzzles and Problem Solving

Granny wants to display a picture of each of her four grandchildren on the wall.

Shona and Cece want to be placed next to each other.

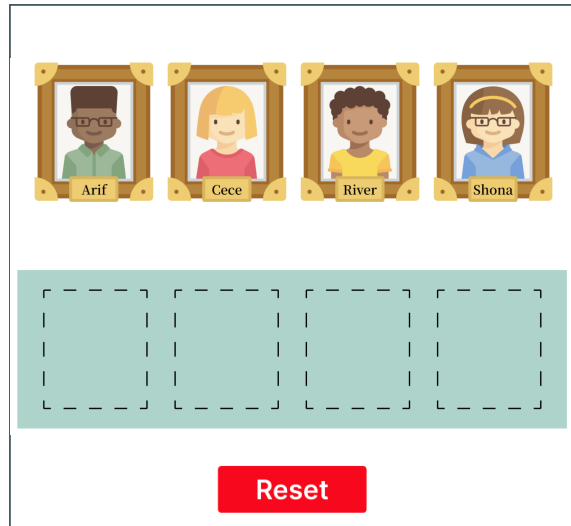
Arif wants to be next to Cece.

River doesn't have any preferences.

How many different ways can the pictures be displayed so that everyone is happy?

- A 1 B 2 C 4 D 6 E 12

Place the pictures on the wall to try out all the possible arrangements.



Explanation

- To answer this question, we need to work **methodically** to find each of the possible arrangements.
- We are told that **Shona** must be next to **Cece**, and **Arif** must be next to **Cece**. This means that these three pictures must always be in a row, either as **Shona, Cece, Arif** or **Arif, Cece, Shona**.
- **River** doesn't have any preferences, so their picture can go at either end of the other three pictures.
- This means there are **four** possible arrangements:
 1. **Shona, Cece, Arif, River**
 2. **River, Shona, Cece, Arif**
 3. **Arif, Cece, Shona, River**
 4. **River, Arif, Cece, Shona**

Creative Comprehension

Creative Comprehension

Source 3. Vase discovered by archaeologists at the site of an ancient fortress believed to be the location of ancient Troy



Source 4. Carbon dating graph. Scientists can tell how old something is by looking at the percentage of Carbon-14 atoms that are remaining in it.

Decay of Carbon-14



Look at **Source 3**. The three codes on the vase mean 'Zeus', 'army' and 'star' in some order.

Work out which code matches each word, then use this to translate the code below.



- A razor
- B music
- C mazes
- D master
- E amaze

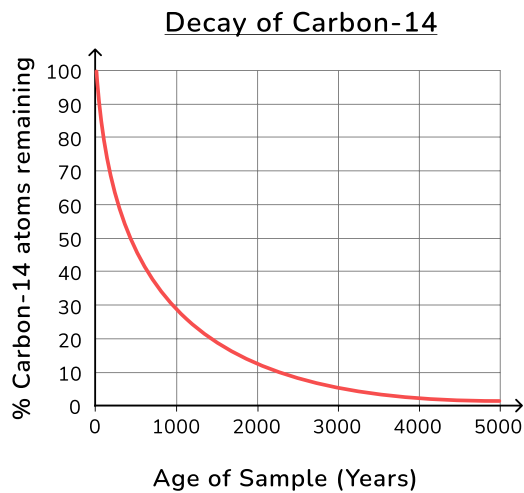
Explanation

- Firstly, we need to decode the symbols in **Source 3** using the information provided in the question.
- We know that the **first letter** of 'star' is the same as the **last letter** of 'Zeus', so we need to look for two codes that have the **same symbol** in these positions.
- The **first symbol** in the **top code** is the same as the **last symbol** in the **bottom code**, so the **top code** must represent 'star' and the **bottom code** must represent 'Zeus'.
- This means that the **middle code** must represent 'army'!
- Now that we know what letter each symbol represents, we can decode the word in the question:

⚡	⚡	♁	☾	♁	☾
m	a	s	t	e	r

Creative Comprehension

Source 4. Carbon dating graph. Scientists can tell how old something is by looking at the percentage of Carbon-14 atoms that are remaining in it.



When it was found, the vase in **Source 3** contained traces of food. Using **carbon dating**, we can estimate the age of this food.

The percentage of Carbon-14 atoms remaining in these food traces is **7%**.

Use this information and the graph in **Source 4** to estimate how old the food is.

A 100 years

B 1500 years

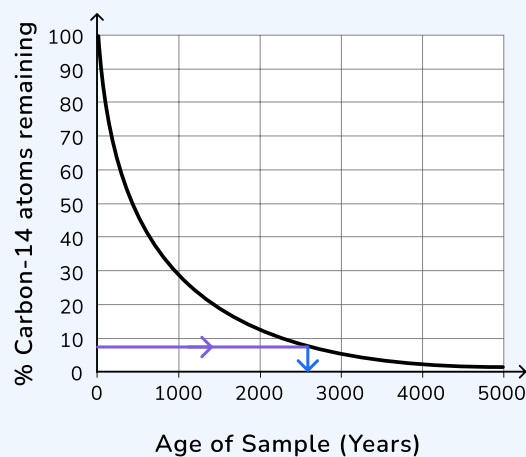
C 2000 years

D 2600 years

E 3050 years

Explanation

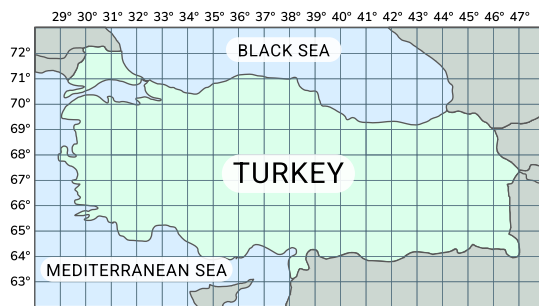
- We need to use the line graph in **Source 4** to work out the age of the food traces found in the vase.
- The **y-axis** of the graph shows the **percentage of Carbon-14 atoms remaining**. The percentage of Carbon-14 atoms in the food traces is **7%**, so we need to find where 7% would be on the y-axis.
- Then, we need to draw a **horizontal line** from 7% across the graph until we meet the **curved line**.
- We now need to draw a **vertical line** down to the **x-axis**, which will show us the **age of the food traces**.
- We meet the x-axis between 2000 and 3000, so the food traces found in the vase are **2600 years old!**



Creative Comprehension

King of Mycenae, to find her. The King of Mycenae gathered his men and set off to attack Troy in an attempt to retrieve the Queen. It is said that the war continued for 10 years. Scholars were uncertain of the historical accuracy of this war until the discovery of evidence pointing towards the existence of the ancient land of Troy. This land was located on the coast of the country we now call Turkey.

Source 2. Map of modern-day Turkey



Below are the coordinates of five cities in modern-day Turkey.

Canakkale	29.75°, 70.18°
Gaziantep	43.89°, 66.07°
Kayseri	39.14°, 66.06°
Trabzon	42.00°, 67.76°
Van	45.43°, 66.12°

Using **Sources 1–4**, identify the city which would be closest to ancient Troy.

- A Canakkale B Gaziantep C Kayseri
 D Trabzon E Van

Explanation

- In **Source 1**, we learn that Troy is located '**on the coast of the country we now call Turkey**'.
- We are told in the question that all five of the cities in the table are located in modern-day Turkey, so we need to figure out which of these cities is **by the sea**.
- **Canakkale**, located at (29.75°, 70.18°), is the only option which is by the sea!

