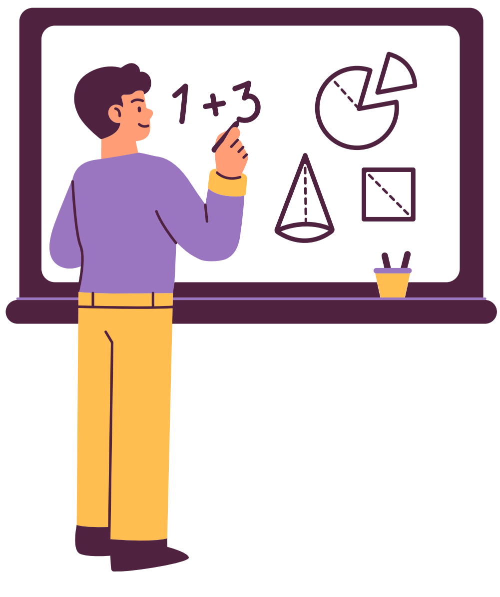
OC - MATHEMATICAL REASONING

Scholarly



Steve Xu
Scholarly Publishing

EDITOR'S NOTE

Editor's Note,

My name is Steve and I set out on a mission to truly empower kids in their educational endeavours. Having been through all the rigorous tests myself and in the education industry for over a decade I have come to understand the fundamental factors required for students to excel in their education.

I know you will find this book valuable and if you would like to speak to my team and I reach out to us here: https://scholarlytraining.com/

Regards, Steve

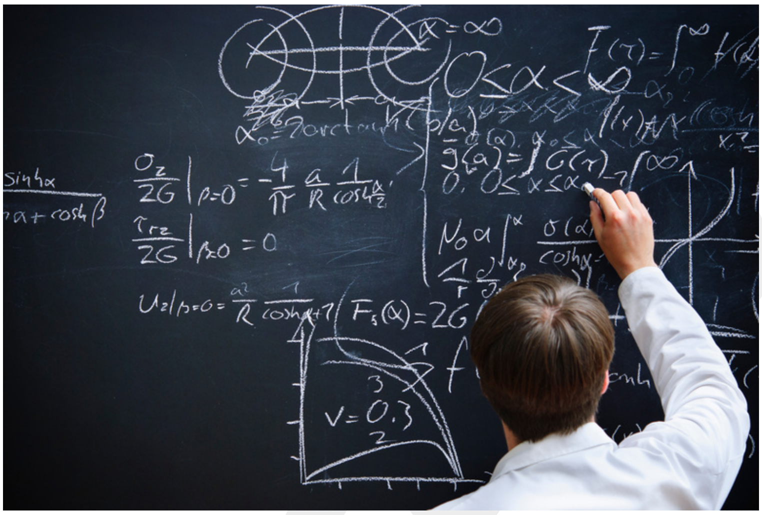
TABLE OF CONTENTS

TABLE OF CONTENTS

1

Chapter 1:

Introduction to the Opportunity Class Mathematical Reasoning test



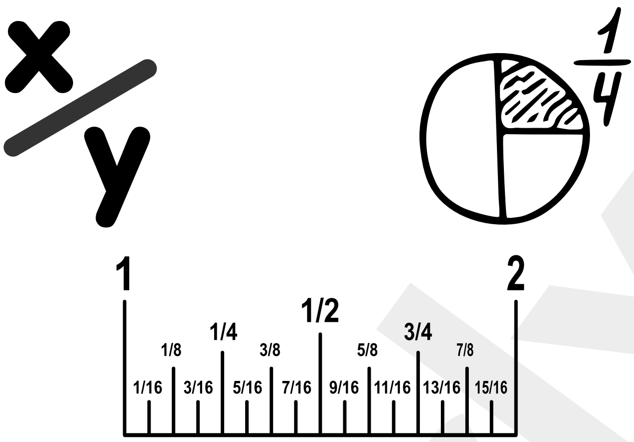
The mathematical reasoning section of Opportunity Class test assesses students' understanding of mathematical concepts and their ability to solve problems. It includes 35 multiple choice questions with the time limit of 40 minutes. The questions cover a range of mathematical concepts including numbers and operations, algebra, geometry, measurement, data analysis, and problem-solving.

The purpose of the OC test is to identify students who demonstrate a high level of mathematical ability and potential, and provide them with the opportunity to receive an education that is tailored to their abilities and needs. The test is designed to assess a student's ability to think critically, solve problems, and apply mathematical concepts to real-world situations.

The OC test is considered a high-stakes test, as the results are used to determine admission to selective high schools. The test is also used to inform decisions about curriculum, instruction, and assessment at the school and district level. The test results can also be used to identify areas where students need additional support and to develop targeted interventions to help them improve their mathematical ability.

2

Chapter 2:
Fractions and Decimals



- Basic concepts of fractions, including numerator, denominator, and equivalent fractions

The basic concepts of fractions and decimals, which are fundamental mathematical concepts that are essential for understanding more advanced mathematical concepts and problem-solving.

- A fraction is a number that represents a part of a whole. It is written as two numbers separated by a slash, with the top number called the numerator and the bottom number called the denominator.

For example, the fraction 23 represents 2 parts out of 3. The denominator represents the total number of parts in the whole, while the numerator represents the number of parts being considered.

- One important concept related to fractions is equivalent fractions. Equivalent fractions are different fractions that represent the same value.

For example, 23 and 46 are equivalent fractions because they both represent the same value (2 parts out of 3). To find equivalent fractions, you can multiply or divide both the numerator and denominator by the same number.

- Simplifying fractions

Another important concept related to fractions is simplifying fractions. Simplifying fractions means writing them in their simplest form. To simplify a fraction, you can divide both the numerator and denominator by their greatest common factor (GCF).

For example, to simplify the fraction 1224, you can divide both the numerator and denominator by the GCF of 12, resulting in the simplified fraction of 12.

- Understanding decimal place value and converting between fractions and decimals

Decimals are another important concept related to fractions. A decimal is a number that represents a value between two whole numbers. It is written as a whole number followed by a decimal point and one or more digits.

For example, 0.75 represents 3 parts out of 4 or 75 out of 100.

- To convert a fraction to a decimal, you divide the numerator by the denominator.

For example, to convert the fraction 23 to a decimal, you divide 2 by 3, resulting in the decimal 0.6666... (which is an infinite decimal)

- Conversely, to convert a decimal to a fraction, you can write the decimal as a fraction with a denominator of 10 raised to the number of decimal places.
- For example, to convert the decimal 0.75 to a fraction, you can write it as the fraction 75100.

Exercises

1. 45 of the students in Mr Lacson’s class are involved in academic contests. Of those students, 13 are involved in a special activity. What fraction of his students are involved in the special activity?

A. 54
B. 415
C. 24
D. 920

2. Jade has 23 gallon of blue paint and 712 gallon of red paint.
If she has a total of 218 gallons of paint, how many gallons are neither red nor blue?

A. 85
B. 78
C. 910
D. 114

3. Wonder woman baked a banana muffin and used 34 cups of oats.
You wanted to bake ½ of what Wonder woman made.
How much oats should you use?

A. 25
B. 46
C. 38
D. 12

4. To get home, Kate rides the bus for 18 kilometers and walks for another 4 kilometers. What fraction of kilometers does Kate travel by bus?

A. 211
B. 911
C. 29
D. 184

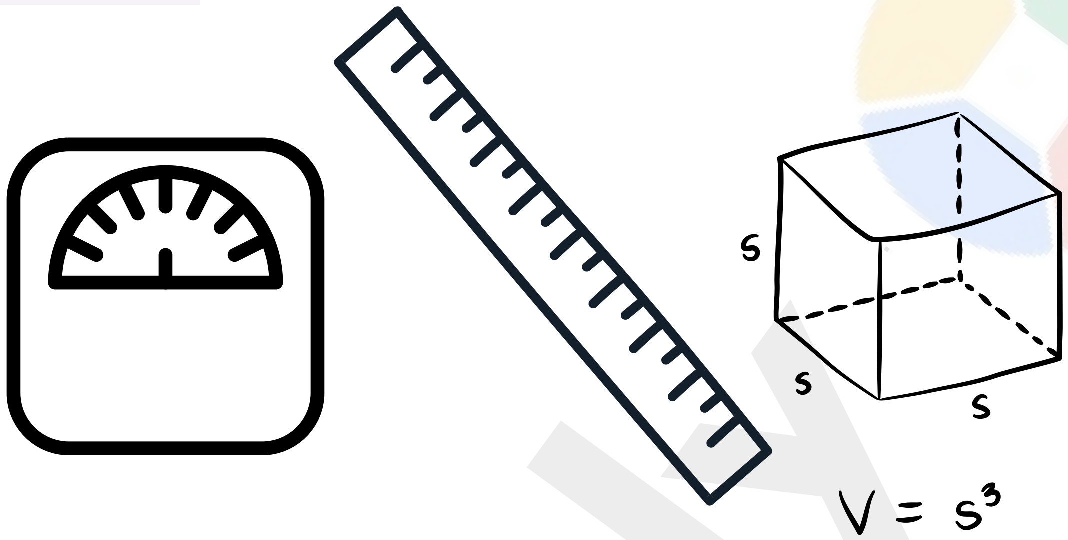
5. James has a piece of log that is 34 of a meter in length. He needs to cut pieces that are 116 of a meter length. How many pieces can he cut?

A. 12 pieces
B. 10 pieces
C. 15 pieces
D. 8 pieces

Answers

1. **B** **2.B** **3.C** **4.B** **5.A**

Chapter 3: Unit Conversion



- Basic concepts of unit conversion, including understanding the relationship between different units of measurement (e.g. length, weight, volume)

Unit conversion is the process of converting a measurement from one unit to another. It is important to understand the relationship between different units of measurement and how to convert between them. For example, it is important to know how to convert between different units of length (e.g. meters, feet, inches), weight (e.g. kilograms, pounds), and volume (e.g. liters, gallons).

To convert between different units of measurement, you need to understand the relationship between them.

- Length: Length is a measure of the distance between two points. Common units of length include meters, feet, inches, centimeters, and kilometers. To convert between different units of length, you need to understand the relationship between them.

For example, there are 100 centimeters in 1 meter and 12 inches in 1 foot. By understanding these relationships, you can use a conversion factor to convert between different units. A conversion factor is a ratio that expresses the relationship between two units of measurement.

- Weight: Weight is a measure of the force exerted by gravity on an object. Common units of weight include kilograms, pounds, and ounces. To convert between different units of weight, you need to understand the relationship between them.

For example, there are 16 ounces in 1 pound and 1 kilogram is approximately 2.2 pounds. By understanding these relationships, you can use a conversion factor to convert between different units.

- Volume: Volume is a measure of the amount of space an object occupies. Common units of volume include liters, gallons, and milliliters. To convert between different units of volume, you need to understand the relationship between them.

For example, there are 1000 milliliters in 1 liter and 1 gallon is approximately 3.785 liters. By understanding these relationships, you can use a conversion factor to convert between different units.

It is important to understand these basic concepts of unit conversion in order to work with measurements effectively in the Mathematical reasoning test.

- Explanation of the importance of unit conversion in real-life situations

Unit conversion is an essential skill for many real-world situations. Understanding how to convert between different units of measurement is important in various fields and everyday life such as:

- Cooking and Baking: When following a recipe, ingredients are often measured in different units (e.g. cups, tablespoons, teaspoons, grams, ounces). Being able to convert between these units is important to ensure the recipe turns out correctly.

- Engineering and Technical fields: In engineering and technical fields, unit conversion is important for understanding and working with technical specifications, such as for machinery or materials. Engineers and technicians often need to convert measurements between different units to ensure that equipment is functioning correctly and safely.

- International Trade and Travel: In international trade and travel, it is important to understand how to convert between different units of measurement, as measurements can vary from country to country. This is particularly important in fields such as import/export and logistics.

- Science: In science, it is important to be able to convert between different units of measurement to compare and analyse data. Scientists often work with measurements in different units, and the ability to convert between units allows for more accurate comparisons and analysis.

1. Angela used 2.5 litres of water to fill six glasses.

If Angela evenly distributed the water into the six glasses, how many millilitres of water did she pour into one glass?

A. 512
B. 416
C. 4123
D. 0413
E. 41623

2. Ruby found a small caterpillar in her garden last week.

The caterpillar was only 35 millimetres long when Ruby found it.

After just one week, the caterpillar grew 4 times as long.

How many centimetres long was the caterpillar after just one week?

A.14 centimetres
B. 28 centimetres
C. 35 centimetres
D. 140 centimetres
E. 280 centimetres

3. Tom placed 15 metal balls inside a pouch. The total mass of the balls was 1.2 kilograms.

If each metal ball has the same mass, each metal ball is how many grams?

A. 800 grams
B. 80 grams
C. 8 grams
D. 0.8 grams
E. 0.008 grams

4. Jane used two ribbons to wrap a present.

One of the ribbons was 1 metre long and the other ribbon was 30 centimetres longer than the other ribbon. What is the combined length, in centimetres, of the two ribbons that Jane used to wrap the present?

A. 1.3 centimetres
B. 2.3 centimetres
C. 130 centimetres
D. 230 centimetres
E. 1 300 centimetres

x

5. Karl has 212 hours to answer a three-part test.
He plans to spend the same amount of time on each part of the test.
How many minutes should Karl spend on the second part of the test?

A. 75 minutes
B. 70 minutes
C. 60 minutes
D. 55 minutes
E. 50 minutes

Answers

1. **E 2.A 3.B 4.D 5.B**

4

Chapter 4:

Money Problems

Basic concepts of solving money problems

Money is a common way to represent numbers and values in our everyday life. It is important to understand the basic concepts of solving money problems, including using money to represent numbers, making change, calculating discounts, and understanding currency and exchange rates. These concepts are essential for understanding financial concepts and solving real-world problems.

Using money to represent numbers

It is important to understand how to represent money as a decimal or fraction and how to perform basic operations such as addition, subtraction, multiplication, and division with money.

For example, $3.50 represents three dollars and fifty cents. To add $3.50 and $2.25, you would add 3.50 + 2.25 = 5.75 or $5.75.

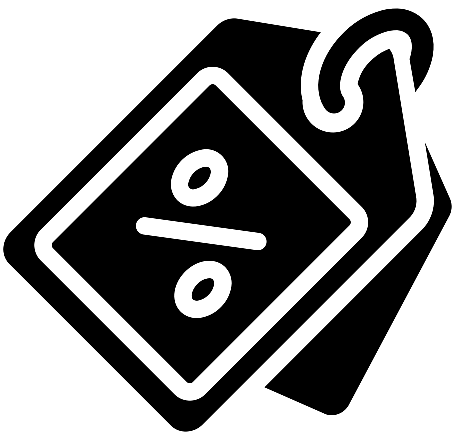
Making change

Making change is an important concept related to money. Making change means determining the amount of money that is due in coins and bills for a given amount of money. It requires understanding different denominations of coins and bills, and how to count them.

For example, if a customer wants to buy a $3.50 item and pays with a $5 bill, the customer would receive $1.50 in change.

Calculating discounts

Calculating discounts is another important concept related to money. A discount is a reduction in the original price of a product or service. To calculate a discount, you need to understand the relationship between the original price, the discount rate, and the final price.



For example, if a product has an original price of $100 and a 10% discount, the final price would be $100 - (0.10 x $100) = $90. Understanding how to calculate discounts is important when making purchase decisions, it is also important to be able to compare different discounts, to find the best deal.

Exercises

1. Annie spent $3.45 on Pocky sticks every day when on vacation in Bora Bora from 27th February 2020 to 8th March 2020. How much money did she spend on Pocky sticks?

A. $379.50
B. $14.45
C. $37.95
D. $6.90

2. If 1 South African Rand is worth 0.05 US Dollars, how many South African Rand is 1 US Dollar worth?

A. 20
B. 1.05
C. 0.05
D. 1.95

3. Donna went on a picnic. She spent $686.18 on the bus fare, $483.93 on food, and $663.47 on shopping. If she had two $1,000 notes with her, then how much amount is left with her now?

A. $172.90
B. $170.49
C. $165.18
D. $166.42

4. The cost of 5 coloured pencils is $30. Find the cost of 2 packets of coloured pencils if each packet has 10 coloured pencils

A. $114
B. $120
C. $132
D. $126

5. Andrew gave three-eighths of his money to his brother.
If Andrew was left with $160, how much money did Andrew originally have?

A. $196
B. $200
C. $256
D. $400
E. $436

Answers

1.C
2. A
3. D
4. B
5. C

5

Chapter 5:

Time, Date and Directions Problems

Basic concepts of time, date and direction

Basic concepts of time, date, and direction are essential for understanding and solving problems related to time and navigation. In this chapter, we will cover the following topics:

Telling time: Telling time is a basic concept that is essential for understanding and solving problems related to time. It is important to understand how to read a clock, including the hours, minutes, and seconds, as well as how to use a.m. and p.m. notation. It is also important to understand how to use time expressions such as "half past," "quarter to," and "quarter past."

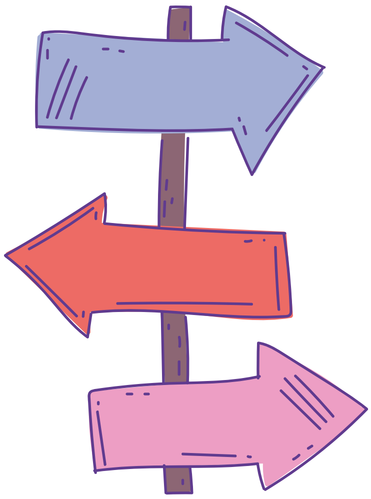
Example: If the clock reads "3:15," it is "quarter past three" or "3:15."

Understanding Calendars

Understanding calendars is important for understanding and solving problems related to dates. It is important to understand how to read and write dates in different formats, including the day, month, and year. It is also important to understand how to use a calendar to determine the day of the week for a given date and how to use a calendar to determine the number of days between two dates.

Example:
If today is Wednesday, January 12th, 2022, and you want to know what day of the week it will be in two weeks, you can use a calendar to determine that it will be Wednesday, January 26th, 2022.

Following and giving directions



Following and giving directions is important for understanding and solving problems related to navigation. It is important to understand how to use cardinal and ordinal directions (north, south, east, west, etc.) and to understand how to use landmarks and street names to give and follow directions. It is also important to understand how to use a map to give and follow directions.

Example: If you are heading north on Main Street and you come to an intersection with Elm Street, to continue on Main Street, you turn left (west).

Exercises

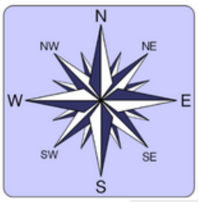
1.Kim left the library at exactly 3:15 PM, and drove to the museum at an average speed of 40 kilometres per hour.
If the museum was 60 kilometres from the library, at what time did he arrive at the museum?

A. 4:15 PM
B. 4:30 PM
C. 4:45 PM
D. 5:00 PM
E. 5:15 PM

2. The population of the town of Hillsboro doubles every year.
If the population of Hillsboro in 2020 was 20 000, at what year was the population of Hillsboro 10 000?

A. 2019
B. 2018
C. 2016
D. 2015
E. 2010

3. A compass is shown below.



John was facing the northeast before he made seven quarter turns anti-clockwise.
In what direction was John facing after he made the turn?

A. Northwest
B. West
C. Southwest
D. East
E. Southeast

4. Robert took vacation leave from his work that lasted 1 week 3 days.
His vacation leave started on Wednesday, September 24.
On which day and date will his vacation leave end?

A. Friday, October 2
B. Friday, October 3
C. Saturday, October 3
D. Sunday, October 3
E. Saturday, October 4

5. Herbert needs to make four copies of the report in time for the 10:00 AM meeting today.
Each copy of the report has 80 pages.
If the office printer can print 120 pages per hour, what is the latest time that Herbert can start printing the reports and still be in time for the meeting?

A. 7:20 AM
B. 7:30 AM
C. 7:40 AM
D. 8:20 AM
E. 8:40 AM

Answers

1.C 2. A 3. E 4. B 5. A

6

Chapter: 6

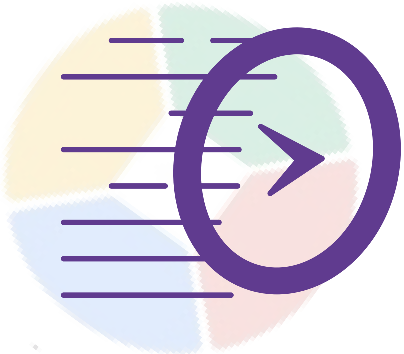
Speed, Distance and Time Problems

Basic concepts of speed, distance, and time, including calculating speed, distance, and time, and solving related problems

Basic concepts of speed, distance, and time are essential for understanding and solving problems related to motion and transportation.

- Speed is a scalar quantity that is defined as the rate of change of displacement, and it is measured in units such as meters per second (m/s) or kilometers per hour (km/h).
- Distance is a scalar quantity that is defined as the total length of the path covered by an object, and it is measured in units such as meters (m) or kilometers (km).
- Time is a scalar quantity that is defined as the duration of an event, and it is measured in units such as seconds (s) or hours (h). In this chapter, we will cover the following topics:

Calculating speed, distance, and time



To calculate speed, you need to know both the distance an object has travelled and the time it took to travel that distance. The formula for speed is:

Speed = Distance / Time

For example, if a car travels 60 miles in 2 hours, the speed of the car is:

Speed = 60 miles / 2 hours = 30 mph

To calculate distance, you need to know both the speed of an object and the time it took to travel that distance. The formula for distance is:

Distance = Speed x Time

For example, if a car travels at a speed of 60 mph for 2 hours, the distance travelled by the car is:

Distance = 60 mph x 2 hours = 120 miles

To calculate time, you need to know both the distance an object has travelled and the speed it was travelling at. The formula for time is:

Time = Distance / Speed

For example, if a car travels 120 miles at a speed of 60 mph, the time it took the car to travel that distance is:

Time = 120 miles / 60 mph = 2 hours

Understanding and using rates and unit rates

A rate is a comparison of two quantities, such as miles per hour (mph) or kilometers per hour (km/h). A unit rate is a rate with a denominator of 1, such as 60 miles per hour or 80 kilometers per hour. Understanding and using rates and unit rates is important for solving problems related to motion and transportation, such as determining how long it will take to travel a certain distance at a certain speed, or how far an object will travel at a certain speed for a certain amount of time.

For example, if you want to determine how long it will take to travel a distance of 100 miles at a speed of 50 mph, you can use the formula:

Time = Distance / Speed

Time = 100 miles / 50 mph = 2 hours

Another example, if you want to determine how far an object will travel at a speed of 40 mph for 3 hours, you can use the formula:

Distance = Speed x Time

Distance = 40 mph x 3 hours = 120 miles

Exercises

1. Hank leaves the school and travels to the park at a speed of 22 metres per second.
Six minutes later, Jericho also leaves the school and travels to the park using the same route as Hank at a speed of 25 metres per second.
If the two of them arrive at the park at the same time, what is the distance between the school and the park?

A. 44 kilometres
B. 50 kilometres
C. 55 kilometres
D. 66 kilometres
E. 75 kilometres

2. John leaves Star City and travels to Bay City at the same time that Patrick leaves Bay City and travels to Star City along the same route.
John can reach Bay City in 25 minutes, which is half the time it takes Patrick to reach Star City. How much longer will it take Patrick to reach the halfway point between the two cities than for John to reach the halfway point between the two cities?

A. 1212 minutes
B. 25 minutes
C. 35 minutes
D. 50 minutes
E. 75 minutes

3. Carol and Jenny live on the opposite ends of a straight street.
Jenny leaves her house and walks toward Carol's house one hour after Carol leaves her house and walks toward Jenny's house.

If Carol walks at a rate of 4 kilometres per hour, Jenny walks at a rate of 6 kilometres per hour, and the distance between their house is 54 kilometres, what is the total it takes Carol to walk before she meets up with Jenny?

A. 3 hours
B. 4 hours
C. 5 hours
D. 6 hours
E. 8 hours

4. Ben leaves the dormitory at 9:00 AM and drives to the movie house at a speed of 40 kilometres per hour.
Ten minutes later, Jake also leaves the dormitory and drives along the same route as Ben to the movie house.
If the distance between the dormitory and the movie house was 80 kilometres, how fast was Jake driving if he caught up with Ben at 10:30 AM?

1. 45 kilometres per hour
2. 50 kilometres per hour
3. 53 kilometres per hour
4. 55 kilometres per hour
5. 60 kilometres per hour

5. Reese drives from his house to the mall and then back to his house, taking the same route both ways.

He drives at an average speed of 50 kilometres per hour going to the mall and drives at an average speed of 70 kilometres per hour going back to his house.

What is his average speed for the entire round trip?

A. 50 kilometres per hour
B. 5323 kilometres per hour
C. 55 kilometres per hour
D. 5813 kilometres per hour
E. 60 kilometres per hour

Answers
1. D 2. A 3. D 4. A 5. D

7

Chapter 7:

Number Patterns and Sequences

Basic concepts of number patterns and sequences, including identifying patterns and sequences, and predicting the next number in a sequence

A pattern is a sequence of numbers or shapes that follow a specific rule or relationship. Identifying patterns is important for understanding and solving problems related to mathematical patterns and series. There are different types of patterns such as numerical patterns, geometric patterns, and algebraic patterns.

Numerical patterns

In numerical patterns, the numbers are arranged in a specific order, and the pattern can be identified by looking at the relationship between the numbers.

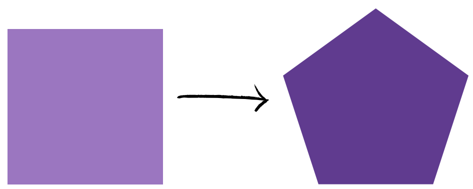
For example, in the sequence 2, 4, 6, 8, 10, the pattern is that each number is two more than the previous number. This pattern can be written as n+2 where n is the previous number.

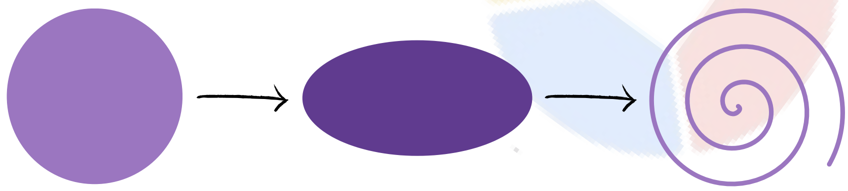
2 4 6 8 10

Geometric Patterns

A triangle, followed by a square, followed by a pentagon: This is an example of a geometric pattern where the number of sides of the shape is increasing by one with each term.

A circle, followed by an oval, followed by a spiral: This is an example of a geometric pattern where the shape is changing with each term.





Algebraic patterns

x, 2x, 3x, 4x, 5x: This is an example of an algebraic pattern where each term is a multiple of the previous term. The pattern can be written as nx where n is a whole number

2y + 3, 3y + 2, 4y + 1: This is an example of an algebraic pattern where each term has a linear relationship with the previous term.

One of the key skills tested in the OC Mathematical Reasoning test is the ability to identify patterns in numerical sequences. This may involve recognising a specific rule or relationship between the numbers in a sequence, such as increasing or decreasing by a certain amount. In the test, you will be presented with a sequence of numbers and asked to identify the pattern, use that pattern to generate additional terms in the sequence, and predict the next number in the sequence.

For example, consider the following sequence of numbers: 2, 4, 6, 8, 10. When we look at this sequence, we can see that each number is two more than the previous number. This pattern can be written as n+2 where n is the previous number. This pattern can be used to generate additional terms in the sequence, for example, if we want to find the next number in the sequence, we can use the pattern n+2 = 12.

To identify a pattern, it is important to look for a consistent rule or relationship between the numbers. It can be helpful to write out a few terms of the sequence and try to find a pattern in the numbers. Once a pattern is identified, it can be used to generate additional terms in the sequence.

Predicting the next number in a sequence is a skill that is commonly tested in the OC Mathematical Reasoning test. This skill involves using a specific rule or formula to determine the next number in a sequence based on the pattern that has been identified.

For example, consider the sequence 1, 4, 9, 16, 25. We have identified the pattern in this sequence is that each number is the square of the previous number. This pattern can be written as n^2 where n is the previous number. To predict the next number in the sequence, we use the pattern n^2 = 36

It's important to understand that identifying patterns in numerical sequences is based on the pattern that has been identified. In some cases, the pattern may be complex, and it may not be possible to predict the next number in the sequence.

Understanding and using arithmetic and geometric sequences

An **arithmetic sequence** is a sequence of numbers in which the difference between any two consecutive terms is a constant. In the OC Mathematical Reasoning test, you may be asked to find the common difference of an arithmetic sequence, determine the nth term of an arithmetic sequence, or use an arithmetic sequence to solve a problem.

For example, in a question, you might be given an arithmetic sequence 2, 5, 8, 11, 14 and asked to find the common difference, which is 3. Or you might be given a problem where an object is moving at a constant speed and asked to find how far it will travel in a certain amount of time. In this case, you would use the formula: distance = speed x time, where speed is the common difference and time is the number of terms.

A **geometric sequence** is a sequence of numbers in which the ratio of any two consecutive terms is a constant. In the OC Mathematical Reasoning test, you may be asked to find the common ratio of a geometric sequence, determine the nth term of a geometric sequence, or use a geometric sequence to solve a problem.

For example, in a question, you might be given a geometric sequence 2, 4, 8, 16, 32 and asked to find the common ratio, which is 2. Or you might be given a problem where an object is growing at a constant rate and asked to find its size after a certain amount of time. In this case, you would use the formula: size = initial size x (growth rate)^time, where the growth rate is the common ratio and time is the number of terms.

Exercises

1. The numbers in the boxes below follow a pattern.

23	27	31	35	39	43	?

What number comes next?

A. 46
B. 47
C. 48
D. 49
E. 50

2. In the magic square below, each row, each column, and each diagonal sums up to 15.

6		N
	5	
8		4

What number is **N**?

A. 4
B. 5
C. 2
D. 8
E. 10

3. What number completes the input/output table below?

INPUT	OUTPUT
94	99
85	90
75	80
62	67
16	?

A. 20
B. 21
C. 25
D. 28
E. 30

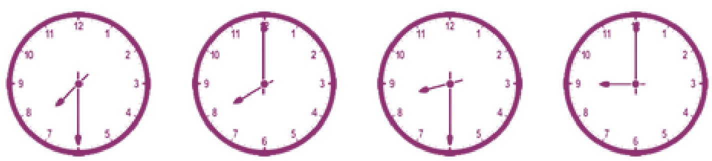
4. Philip created a pattern by colouring some squares on a number chart. His partially completed number chart is shown below.

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
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

What number should he colour next?

A. 30
B. 31
C. 32
D. 33
E. 34

5. The times on the analogue clocks below follow a pattern.



What time will the next analogue clock show?

A. 9:30
B. 10:00
C. 10:30
D. 11:00
E. 11:30

Answers
1.B 2.C 3.B 4.C 5.A

8

Chapter 8: Ratio and Proportion

Basic concepts of ratio and proportion, including understanding and comparing ratios, and solving proportion problems

- **Understanding ratio**

A ratio is a way of comparing two or more quantities. It is written as a fraction with the first quantity as the numerator and the second quantity as the denominator.

For example, the ratio of apples to oranges in a basket can be written as 3:5, which means there are 3 apples for every 5 oranges. Ratios can also be written in the form of a fraction, such as 35, or as a decimal, such as 0.6.

It is important to remember that the order of the quantities does not matter. For example, the ratio of apples to oranges (3:5) is equivalent to the ratio of oranges to apples (5:3)

- **Comparing ratios**

When comparing ratios, it is important to convert them to a common form, such as a fraction or decimal.

For example, the ratio 3:5 can be converted to a fraction of 35 and a decimal of 0.6. Once the ratios are in a common form, we can compare them by comparing the numerator or the decimal form.

Examples:

A ratio of 2:3 is equivalent to a ratio of 4:6, 8:12, and so on.
A ratio of 4:8 is equivalent to a ratio of 1:2, or as a decimal, 0.5

Solving proportion problems using cross-multiplication

A proportion is an equation that states two ratios are equal.

For example, 35 = x10. To solve proportion problems, we can use cross-multiplication, which is multiplying the numerator of one ratio by the denominator of the other ratio.
In this example, we would cross-multiply to get 3 * 10 = x * 5. This results in x = 3*105 = 6.

Understanding and using cross-multiplication and proportionality

Proportionality is a relationship between two quantities where one quantity is a constant multiple of the other.

For example, the relationship between speed and distance travelled can be described as distance = speed * time. In this example, speed and time are inversely proportional, meaning that as one increases, the other decreases.

Example

A car travels 60 miles in 2 hours, what is its speed?
In this example, we know that distance = speed * time, so we can use proportionality to calculate the speed. We can find the speed by solving for it, we get speed = distance / time = 60 / 2 = 30 mph.

Exercises

1.The ratio of the current ages of Mike and Noel is 7 to 11.
Which of the following could be the ratio of their ages 5 years from today?

A. 1 to 3
B. 9 to 20
C. 4 to 15
D. 3 to 5
E. 2 to 3

2. A rectangular garden has a width of 200 centimetres 250 millimetres and a length of 6 metres.
What is the ratio of the width to the length of the rectangular garden?

A. 1 to 4
B. 1 to 3
C. 3 to 8
D. 1 to 2
E. 3 to 4

3. A three-ingredient frosting recipe calls for butter, sugar, and milk mixed in the ratio of 3:4:12, by volume, respectively.
The ratio recipe is changed so that the ratio of butter to milk is doubled and the ratio of sugar to milk is halved.

Which of the following is the ratio of the amount of butter to the amount of sugar to the amount of milk in the new recipe?

A. 6 to 2 to 24
B. 6 to 1 to 24
C. 6 to 1 to 12
D. 3 to 1 to 6
E. 3 to 8 to 6

4. The ratio of the amount of money in Cecile's savings account to the amount of money in John's savings account is 3 to 2.

If Cecile will increase the amount of money in her savings account by 20 percent and John will increase the amount of money in his savings account by $200, the ratio will become 6 to 5.

How much money is in Cecile's savings account?

A. $200
B. $400
C. $480
D. $600
E. $720

5. In the morning, the ratio of the number of men to the number of women who attended the lecture was 7 to 3.

However, by noon 15 of the men left the lecture but 15 additional women joined the lecture, and the ratio of men to women became 13 to 7.

How many more men than women were in the lecture by noon?

A. 105
B. 90
C. 75
D. 60
E. 30

Answers

1.E 2.C 3.D 4.D 5.B

9

Chapter 9:

Perimeter and Area Problems

- **Basic concepts of perimeter and area, including calculating perimeter and area of different shapes**
- **Perimeter**

Perimeter is the distance around the outside of a shape. It can be calculated by adding up the lengths of all the sides of a shape. The formula for perimeter depends on the shape of the object. It's important to memorise the formulas for the perimeter of common shapes such as rectangles, squares, circles, triangles, and parallelograms.

Formulas:
Rectangle: $P = 2(\text{length} + \text{width})$
Square: $P = 4s$ (s represents the length of one side)
Circle: $P = 2\pi r$ (r represents the radius of the circle)
Triangle: $P = a + b + c$ (a, b, and c represent the lengths of the sides of the triangle)
Parallelogram: $P = 2(\text{base} + \text{height})$
Hexagon: $P = 6s$ (s represents the length of one side)
Octagon: $P = 8s$ (s represents the length of one side)
Trapezoid : $P = a + b + c + d$ (a, b, c, and d represent the lengths of the sides of the trapezoid)

Examples:

The perimeter of a rectangle with a length of 6 and width of 4 is $2(6+4) = 2(10) = 20$
The perimeter of a square with a side of 5 is $4s = 4(5) = 20$

Area

Area is the amount of space inside a shape. It can be calculated by multiplying the length and width of a shape. The formula for area depends on the shape of the object. It's important to memorise the formulas for the area of common shapes such as rectangles, squares, circles, triangles, and parallelograms.

Formulas
Rectangle: $A = \text{length} \times \text{width}$
Square: $A = s^2$ (s represents the length of one side)
Circle: $A = \pi r^2$ (r represents the radius of the circle)
Triangle: $A = (1/2)bh$ (b represents the base of the triangle and h represents the height)
Parallelogram : $A = bh$ (b represents the base of the parallelogram and h represents the height)
Hexagon: $A = ((3\sqrt{3})/2)s^2$ (s represents the length of one side)
Octagon: $A = 2(1+\sqrt{2})s^2$ (s represents the length of one side)
Trapezoid : $A = ((a+b)h)/2$ (a, b represents the lengths of the parallel sides of the trapezoid, h is the height)

Examples:

The area of a rectangle with a length of 6 and width of 4 is $6 \times 4 = 24$
The area of a square with a side of 5 is $s^2 = 5^2 = 25$

Understanding the relationship between perimeter and area and solving related problems

Perimeter and area are related in that the perimeter of a shape can be used to calculate the area of that shape.

For example, the perimeter of a rectangle can be used to find the length and width, which can then be used to find the area. Similarly, the perimeter of a circle can be used to find the radius, which can then be used to find the area.

Examples:

1.A rectangle has a perimeter of 40 and an area of 96. What are the length and width of the rectangle?

- In this example, we know that the perimeter is 2(length + width) = 40 and the area is length x width = 96. We can use these formulas to find the length and width of the rectangle.
- We can solve the equation 2(length+width) = 40 and find that length + width = 20.
- Then we can use the second formula to find the length and width, by using the area formula, length x width = 96.
- So, we can find that the length and width are both 12.

2. A square has an area of 64 square units, what is its perimeter?

- In this example, we know that the area of a square is side^2 = 64.
- We can use this information to find the side of the square by taking the square root of the area, √64 = 8.
- Once we have the side, we can use the formula for the perimeter of a square, P = 4s, to find the perimeter, P = 4(8) = 32

It's important to understand the formulas for perimeter and area and how to use them to solve related problems. This includes understanding how to use one formula to find the missing information to use another formula.

Example:

A rectangular garden has an area of 84 square meters and a width of 7 meters. What is the length of the garden?

- In this example, we know that the area of a rectangle is length x width = 84 square meters and the width is 7 meters.
- We can use these formulas to find the length of the rectangle.
- We can solve the equation length x width = 84 and find that length = 84/7 = 12 meters

Exercises

1.Jerry has a rectangular rug that is 80 centimetres long and 40 centimetres wide.

What is the perimeter of Jerry's rug?

A. 120 centimetres
B. 240 centimetres
C. 480 centimetres
D. 1 600 centimetres
E. 3 200 centimetres

2. A sheet of construction paper is 3 metres long and 2 metres wide.

What is the area of the construction paper?

A. 5 square metres
B. 6 square metres
C. 10 square metres
D. 12 square metres
E. 20 square metres

3. A rectangular swimming pool is 16 metres long, 10 metres wide, and 6 metres deep.

How many cubic metres of water is needed to fill the swimming pool?

A. 32 cubic metres
B. 64 cubic metres
C. 480 cubic metres
D. 960 cubic metres
E. 1 920 cubic metres

4. Ruben built a chicken coop in his backyard.

The chicken coop is 7 metres long and has a perimeter of 20 metres.

What is the width of the chicken coop?

A. 3 metres
B. 6 metres
C. 9 metres
D. 12 metres
E. 13 metres

5. A dressmaker cut a square piece of fabric for a dress she was making.

The piece of fabric has an area of 16 square metres.

What is the length of the fabric that the dressmaker cut?

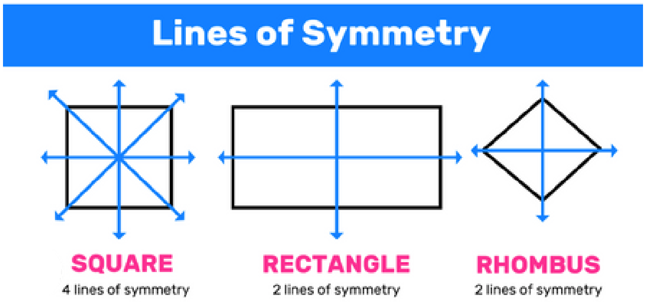
A. 2 metres
B. 4 metres
C. 6 metres
D. 8 metres
E. It cannot be determined.

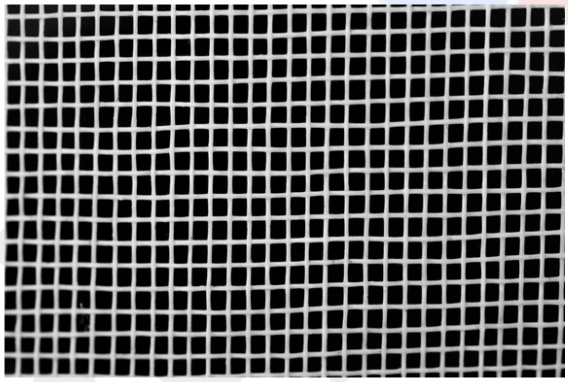
Answers
1.B
2. B
3. D
4. A
5. B

10

Chapter 10:

Line of Symmetry, Grid References, Folding and Nets





- **Basic concepts of line of symmetry, grid references, folding, and nets, including identifying lines of symmetry, using grid references, understanding nets and folding, and solving related problems**

- **Understanding line of symmetry**

A line of symmetry is a line that divides a shape into two identical parts. Shapes that have at least one line of symmetry are said to be symmetrical. Examples of symmetrical shapes include squares, circles, and rectangles.

Examples:

- A square has 4 lines of symmetry, one line of symmetry can be drawn vertically, horizontally and diagonally.
- A circle has infinite lines of symmetry, any diameter of the circle can be a line of symmetry
- A rectangle has 2 lines of symmetry, one line of symmetry can be drawn vertically and horizontally
- A triangle has 0 lines of symmetry, because it does not have a line that can divide it into two identical parts.
- Understanding grid references

A grid reference is a set of coordinates used to identify a specific location on a grid.

Examples:

- On a 5x5 grid, the grid reference for point A is (3,4)
- On a 7x7 grid, the grid reference for point B is (6,2)
- On a 8x8 grid, the grid reference for point C is (5,5)

Understanding folding and net

Folding is the process of bending a flat surface along a straight line, without creasing or tearing the surface. A net is a flat representation of a three-dimensional shape.

Examples:

- A cube can be folded into a net with 6 squares, by unfolding the cube, it will show 6 faces, each with the same size and shape.
- A cylinder can be folded into a net with 3 circles and 2 rectangles, by unfolding the cylinder, it will show 2 circles as the base and top and one rectangle as the side of the cylinder.
- A triangular prism can be folded into a net with 3 rectangles and 3 triangles, by unfolding the triangular prism, it will show 2 triangles as the base and top and 3 rectangles as the side of the triangular prism.

- Understanding and using geometric shapes and transformations. Different types of 2D and 3D shapes are fundamental concepts in geometry.
- 2D shapes are shapes that have only length and width, they exist on a flat surface, such as a piece of paper or a whiteboard.

Examples of 2D shapes include squares, rectangles, triangles, circles, and hexagons.

The properties of these shapes are the number of sides, angles, and vertices.

For example, a square has 4 sides, 4 angles, and 4 vertices. A triangle has 3 sides, 3 angles, and 3 vertices.

- 3D shapes are shapes that have length, width and height, they have volume and can be held in space.

Examples of 3D shapes include cubes, spheres, cylinders, cones, and pyramids.

The properties of these shapes are the number of faces, edges, and vertices.

For example, a cube has 6 faces, 12 edges, and 8 vertices. A sphere has no edges or vertices, but it has one curved surface.

Transformation is the process of changing the position, size, or orientation of a shape. Different types of transformations include translations, reflections, and rotations.

- Translation is a transformation that moves a shape a certain distance in a certain direction without changing its size or orientation.
- Reflection is a transformation that creates a mirror image of a shape across a specific line of reflection, such as the x-axis or y-axis.
- Rotation is a transformation that turns a shape around a specific point by a specific angle, such as hexagons and octagons.

Exercises

1.Karen cuts three identical triangles and four identical squares from construction paper.

The sides of the squares and the sides of the triangles have the same length.

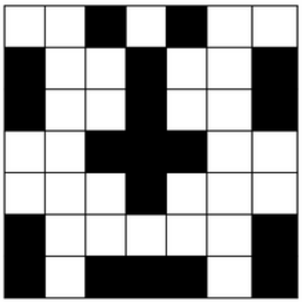
Karen plans to use these shapes to form a three-dimensional figure.

Which of the following three-dimensional figures can she form using any combinations of these seven shapes?

A. A cube
B. A pyramid with a triangular base
C. A pyramid with a square base
D. A prism with a triangular base
E. A prism with a square base

2. Jake made a crossword puzzle.

His completed crossword puzzle is shown below.



Which of the following statements about Jake’s crossword puzzle is true?

A. The crossword puzzle has a vertical line of symmetry only.
B. The crossword puzzle has a horizontal line of symmetry only.
C. The crossword puzzle has both vertical and horizontal lines of symmetry.
D. The crossword puzzle has no line of symmetry.
E. The crossword puzzle has a quarter-turn symmetry.

3. The grid below is made up of 25 identical squares.

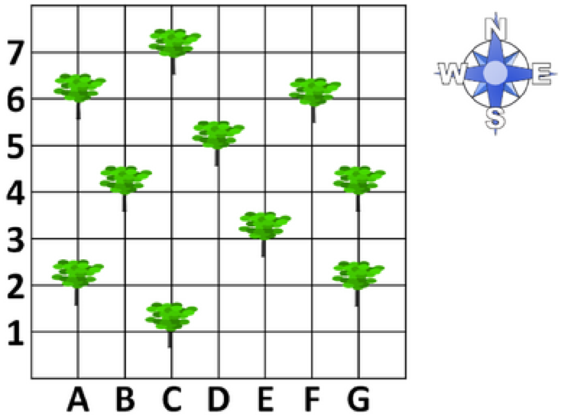
31	33	35	37	39
40	42	44	46	48
51	53	55	57	59
60	62	64	66	68
71	73	75	77	79

The grid will be folded in half along the red dashed lines.

Which of these numbers will coincide with the square containing the number 73?

A. 33
B. 40
C. 42
D. 44
E. 53

4. The grid below shows the location of the ten oldest trees in the forest.

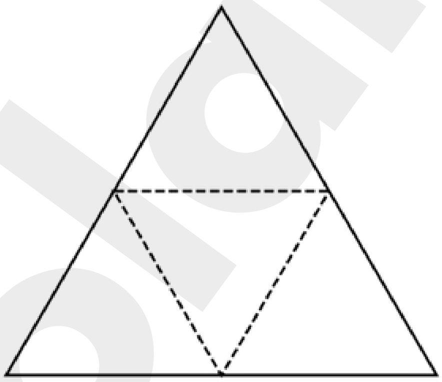


The ranger station is located at C3 and the oldest tree in the forest is located directly northeast of the ranger station.

What is the grid reference for the location of the oldest tree in the forest?

A. D4
B. D5
C. E3
D. F6
D. G4

5.



When the net above is folded along the dashed lines and taped together along the solid lines, the result is a three-dimensional solid.

The resulting three-dimensional solid will have how many faces?

A. 3
B. 4
C. 6
D. 8

Answers

1.D 2.A 3.A 4.D 5.B

11

Chapter 11:

Data and Statistics

- **Basic concepts of data and statistics, including collecting, organising and interpreting data, understanding probability and statistics.**
- **Collecting and Organising Data**

Collecting and Organising Data is a fundamental step in data analysis and statistics. It involves gathering information from various sources and arranging it in a way that makes it easy to understand and interpret. This process is important for making sense of the data and drawing valid conclusions.

Different methods of collecting data include surveys, experiments, and observations. It's important to choose the right method based on the research question and the type of data being collected.

Once the data is collected, it's important to organise it in a way that makes it easy to understand and interpret. There are different types of data, such as categorical data (data that can be divided into categories) and numerical data (data that can be measured or counted).

- Categorical data can be organised using a frequency table, which lists the categories and the number of data points that fall into each category.
- Numerical data can be organised using a line graph, which shows how a numerical variable changes over a period of time, or a bar graph, which can be used to compare different categories.

It's important to choose the most appropriate way to organise the data depending on the type of data. For example, a frequency table is the best way to organise categorical data, while a line graph is the best way to show a trend over time.

- **Interpreting Data**

Interpreting Data is a crucial step in data analysis and statistics, after the data is collected and organised. It involves reading, analysing, and making sense of the data in order to draw valid conclusions.

One of the ways to interpret data is by using charts and graphs, such as bar graphs, line graphs, and pie charts. These visual aids make it easy to understand and compare data. It's important to understand how to read and analyse different types of charts and graphs, such as how to read a line graph to see the trend over time, or how to read a bar graph to compare different categories.

Another way to interpret data is by calculating basic statistics, such as mean, median, and mode. These measures are used to describe the central tendency and spread of the data, providing a summary of the data set and often used to compare different data sets and make predictions.

- **Mean** is the sum of all the data points divided by the number of data points. For example, if a student scores 80, 90, 85, and 70 on a test, the mean score is (80+90+85+70)/4 = 82.5.

- **Median** is the middle value of a data set when it is arranged in numerical order. For example, if a student scores 80, 90, 85, and 70 on a test, the median score is 85.

- **Mode** is the value that appears most often in a data set. For example, if a student takes a test and scores 80, 90, 85, 70, 80, 85, 85, the mode score is 85.

Understanding probability and statistics.

Probability is the branch of mathematics that deals with the measurement of the likelihood of an event occurring. It is expressed as a number between 0 and 1, with 0 meaning that an event is impossible to occur and 1 meaning that an event is certain to occur. Different types of probability are theoretical probability and experimental probability.

- Theoretical probability is calculated using the number of favourable outcomes over the total number of possible outcomes. For example, if a coin is flipped, the theoretical probability of getting heads is 1/2, and the theoretical probability of getting tails is 1/2. This type of probability is calculated using mathematical formulas and does not involve conducting any experiments.

- Experimental probability is calculated by conducting an experiment and counting the number of favourable outcomes over a number of trials. For example, if a coin is flipped 10 times and heads come up 5 times, the experimental probability of getting heads is 5/10. This type of probability is calculated by conducting experiments and observing the outcomes.

Statistics is a branch of mathematics that deals with the collection, analysis, interpretation, presentation, and organisation of data.

- Understanding data representation and visualisation

Data representation and visualisation are essential elements in understanding and communicating data. It involves organising and presenting data in a way that makes it easy to understand and interpret. Different types of data representation include tables, bar graphs, line graphs, and pie charts to effectively communicate data.

- A table is a method of organising data in a grid format, with rows and columns. Data can be easily read and compared in a table format. For example, a table can be used to compare the heights and weights of different athletes.

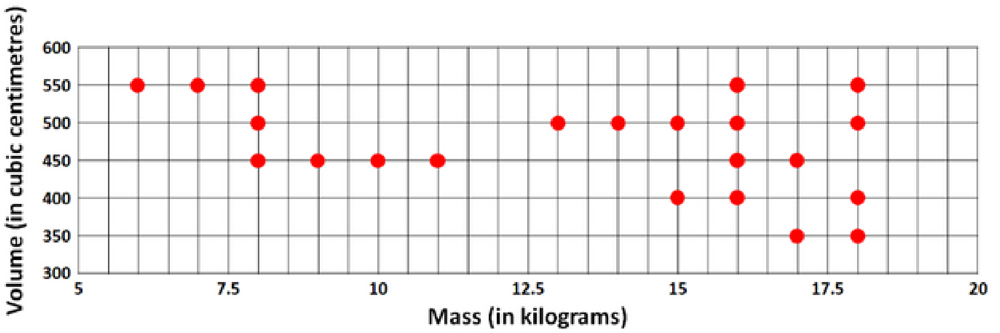
- Bar graphs are a way to visually represent data in a bar format. They are used to compare different categories, and the height of the bars represents the value of the data. For example, a bar graph can be used to compare the number of students in different grades.

- Line graphs are a way to visually represent data over time. They are used to show trends, patterns, and relationships in data. For example, a line graph can be used to show the population of a city over time.

- Pie charts are a way to visually represent data in a circular format. They are used to show the proportion of different categories in a data set. For example, a pie chart can be used to show the percentage of students in different grades in a school.

Exercises

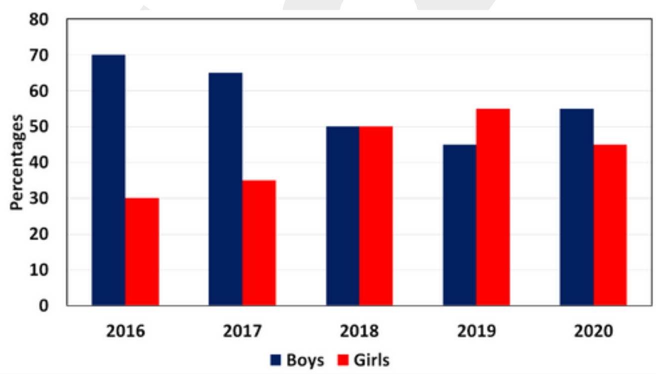
1.A shipping company delivered a total of 22 packages last month.
The dots on the graph below represent the mass and volume of the packages delivered last month.



How many of the packages with a mass of between 5 and 15 kilograms have a volume of more than 500 cubic centimetres?

A. 3 packages
B. 5 packages
C. 7 packages
D. 8 packages
E. 9 packages

2. The data below shows the percentages of attendance, by gender, at the National Comic Book Convention.

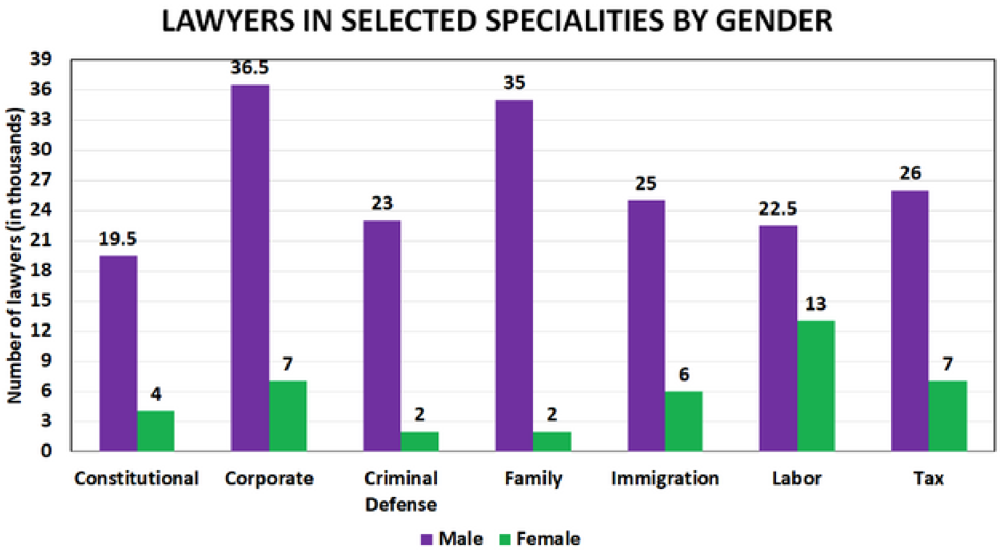


YEAR	2016	2017	2018	2019	2020
TOTAL ATTENDANCE	1 200	1 450	1 580	1 620	1 840

Which of the following statements is true?
The number of girls in attendance in 2016 was more than half the number of boys in attendance in 2016.
The number of boys in attendance in 2017 was twice the number of girls in attendance in 2017.
The same number of boys and girls attended the National Comic Book Convention in 2018.

A. I only
B. II only
C. III only
D. I and II only
E. II and III only

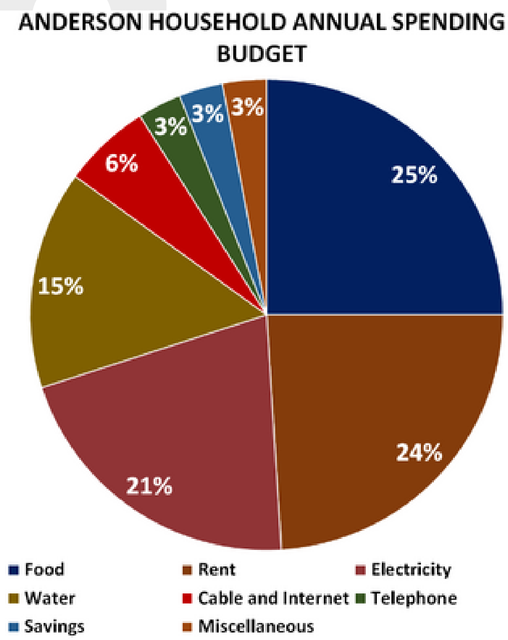
3. The bar graph below shows the number of lawyers in selected specialities distributed per gender.



What percentage of all criminal defence lawyers were female?

8 percent
23 percent
75 percent
82 percent
90 percent

4. The circle graph below shows the Anderson household's annual spending budget.



If the Anderson household's annual spending budget was $2 million, which of the following categories in the circle graph did the Anderson household spend more than $400 000 annually?

I. Electricity
II. Food
III. Rent

A. I only
B. II only
C. III only
D. I and III only
E. I, II, and III

5. The table below shows the percentages of protein, carbohydrates, and fat from three types of food.

FOOD	PERCENTAGE OF PROTEIN	PERCENTAGE OF CARBOHYDRATES	PERCENTAGE OF FAT
Banana	20	35	40
Boiled egg	40	20	20
Milk	40	15	50

Which of the following will supply the most number of grams of protein?

A. 500 grams of banana
B. 250 grams of boiled egg
C. 350 grams of milk
D. 150 grams of banana and 200 grams of boiled egg
E. 200 grams of boiled egg and 200 grams of milk

Answers:

1. A
2. C
3. A
4. E
5. E

12

Chapter 12:

Practise Exercises

1. Frank gave Abe 9 baseball cards, which was 34 the original number of baseball cards he had.

How many baseball cards did Frank originally have?

A. 12 baseball cards
B. 16 baseball cards
C. 18 baseball cards
D. 20 baseball cards
E. 24 baseball cards

2. The hardware store only sells paints in 3.5-litre cans.
If it takes 12 of a litre to paint one window frame, what is the least number of cans of paint that George needs to buy if he needs to paint 60 window frames?

A. 7 cans of paint
B. 8 cans of paint
C. 9 cans of paint
D. 10 cans of paint
E. 12 cans of paint

3. Half of the students in the group have blue eyes, 13 have green eyes, and the rest have brown eyes.

Which of the following can be the total number of students in the group?
I. 6 students
II. 24 students
III. 40 students

A. I only B. II only C. III only D. I and II only E. II and III only

4.A wizard spent 14 of gold to buy a cauldron and 23 of the remainder to buy a spell book.

If the wizard had 12 golds left, how many golds did the wizard originally have?

A.24 golds
B.36 golds
C.40 golds
D.48 golds
E.60 golds

5.Amy won a total of 12 gold medals and 18 silver medals in the recent sports fest.

What fraction of the medals that Amy won in the recent sports fest were gold medals?

A.14
B.13
C.25
D.12
E.23

6.When Victor added 12 identical metal balls to the box, the mass of the box increased by 1.5 kilograms.

If Victor wanted to increase the mass of the box by 2.75 kilograms, how many more such metal balls should he add?

A.10 metals balls
B.12 metals balls
C.18 metals balls
D.20 metals balls
E.22 metals balls

7.The Science Club has 35 male members and 63 female members.

The number of male members of the Science Club is what fraction of the number of female members?

A.720
B.37
C.59
D.57
E.79

8.Carl's age is 17 of Ben's age, and Arthur's age is 14 of Ben's age.

If Carl is 4 years old, how old is Arthur?

A. 7 years old
B. 14 years old
C. 16 years old
D. 24 years old
E. 28 years old

9.The number of cats at a certain animal shelter is 67 of the number of dogs.

If there are 18 cats at the animal shelter, what is the total number of cats and dogs at the animal shelter?

A. 18
B. 21
C. 27
D. 28
E. 39

10.The number of boys in a certain class is 45 of the number of girls.

If there are 16 boys in the class, how many girls are there?

A. 18 girls
B. 20 girls
C. 24 girls
D. 28 girls
E. 30 girls

11.A piece of linen x metres long and y metres wide is priced at $400.

What is the price of the linen, in dollars, per square centimetres?

A. 125xy
B. 25xy
C. 400xy
D. xy25
E. xy400

12.A rectangular water tank measures 3 metres by 5 metres by 8 metres.

How many litres of water is needed to fill the water tank? (1 litre = 1 000 cubic centimetres)

A.12 litres
B.120 litres
C.1 200 litres
D.12 000 litres
E.E 120 000 litres

13.An oil tanker can carry 8 564 000 cubic centimetres of oil.

How many cubic metres of oil can the oil tanker carry?

F.8.564 cubic metres
G.85.64 cubic metres
H.856.4 cubic metres
I. 8 564 cubic metres
J.85 640 cubic metres

14.If 400 centimetres of wire has a mass of 3 000 grams, 2 metres of such wire has a mass of how many grams?

A.1.5 grams
B.15 grams
C.150 grams
D.1 500 grams
E.15 000 grams

15.If barley sells for d dollars per kilogram, how many cents do b grams of barley cost?

K.db1 000 cents
L.db100 cents
M.db10 cents
N.db cents
O.10db cents

16.At the hardware store, a customer can buy n boxes of nails for d dollars.
How many boxes of nails can a customer buy with c cents?

A.100ncd boxes
B.nc100d boxes
C.ndc boxes
D.ncd boxes
E.cdn boxes

17.The front end of the train crossed the intersection 2 seconds before the back end of the train crossed the same intersection.

If the train is 16 metres long and is travelling in a straight line at a constant speed, what is the speed of the train in kilometres per hour?

P.21.6 kilometres per hour
Q.22.2 kilometres per hour
R.24.6 kilometres per hour
S.28.8 kilometres per hour
T.32.4 kilometres per hour

18.A machine can make 55 widgets per minute.

At this rate, how many hours will it take the machine to make 4 400 widgets?

U.13 of an hour
V.23 of an hour
W.1 hour
X.116 hours
Y.113 hours

19.Tony can run m metres in just 3s seconds.

At this rate, how many minutes will it take Tony to run 10n metres?

Z. sm2n minutes
AA.sn2m minutes
BB.10n3sm minutes
CC.n15sm minutes
DD.mn18s minutes

20.If Jerry can complete 34 of the task in one hour, how many minutes does it take him to complete the task?

EE. 45 minutes
FF. 75 minutes
GG.80 minutes
HH.90 minutes
II. 100 minutes

21.Andrew gave three-eighths of his money to his brother.

If Andrew was left with $160, how much money did Andrew originally have?

A.$196
B.$200
C.$256
D.$400
E.$436

22.Mike, Noel, and Patrick only had one-dollar bills in their wallets.

The number of one-dollar bills that Mike had is 4 times as many as Noel had and 13 as many as Patrick had.

If Patrick and Noel, together, had 18 more dollars than Mike, how many one-dollar bills did Mike have?

A.2 one-dollar bills
B.4 one-dollar bills
C.8 one-dollar bills
D.16 one-dollar bills
E.24 one-dollar bills

23.A group of 22 boys and 24 girls only had 10-cent coins in their purses.

All the boys in the group had the same number of 10-cent coins and all the girls in the group had the same number of 10-cent coins.

If the total value of all the coins in the group was $16, how many 10-cent coins did one boy have?

A.1 coin
B.2 coins
C.3 coins
D.4 coins
E.5 coins

24.Lisa bought a toaster for $280.

If Lisa bought the toaster at 30 percent less than the original price, what was the original price of the toaster?

F. $348
G. $364
H. $392
I. $400
J. $420

25 Carl went to the grocery store and bought 15 cartons of milk for $316.80.

If the amount he paid included a 10 percent sales tax on each carton of milk, how much did each carton of milk cost before the sales tax?

A. $18.72
B. $19.20
C. $22.08
D. $22.40
E. $25.38

26 A total of $60 was split evenly among Victor, William, and Yael.
When Victor gave William d dollars, William gave Yael 2d dollars, and Yael gave Victor 3d dollars, then Victor had exactly $30.

How much did Victor give to William?

F. $5
G. $8
H. $10
I. $12
J. $15

27.Carmen went to the supermarket and spent equal amounts buying red apples and green apples.
Green apples were sold at a rate of 5 green apples for one dollar and red apples were sold at a rate of 10 red apples for three dollars.
What was the average (arithmetic mean) cost of the apples that Carmen bought?

A. 20 cents per apple
B. 24 cents per apple
C. 25 cents per apple
D. 30 cents per apple
E. 32 cents per apple

28.During a sale, a customer can buy 2 brownies for 99 cents.

If brownies normally sell for 59 cents each, how much can be saved in buying 10 brownies during the sale?

F. $0.85
G. $0.95
H. $1.10
I. $1.15
J. $2.00

29.A group of nine friends, including Angela, decided to dine in at a restaurant.

Angela spent $8 more than the average amount spent by all nine friends while each of the remaining eight friends spent $12.

How much did the group of friends spend in all at the restaurant?

A. $110
B. $112
C. $114
D. $117
E. $122

30.Arthur spent 13 of the money in his savings account to buy a new phone and 14 of the remaining amount to buy a new video game.
If $200 was left in Arthur’s savings account, how much money did his savings account originally have?

F. $400
G. $480
H. $600
I. $800
J. $2 400

31.If October 1, 1982 fell on a Friday, on what day of the week did October 1, 1987 fall? (Note: It was a leap year in 1984.)

A. Sunday
B. Monday
C. Tuesday
D. Wednesday
E. Thursday

32. Gene can paint a wall in 2 hours while Jeremy can paint the same wall in 1 hour 15 minutes.
Gene started painting the wall at 8:30 AM, and then Jeremy help him at 9:00 AM.
To the nearest minute, at what time will the two of them finish painting the wall?

A. 9:05 AM
B. 9:20 AM
C. 9:35 AM
D. 9:55 AM
E. 10:25 AM

33. Andrew started cleaning his garage at 3:20 PM.
By 4:20 PM, he had finished cleaning three-fourths of his garage.
At what time will he be able to finish cleaning his garage?

F. 4:30 PM
G. 4:35 PM
H. 4:40 PM
I. 4:50 PM
J. 5:00 PM

34. If Cory, working alone at a constant rate, started making 50 widgets at 8:00 AM, he will finish by 8:30 AM.
If Cory and Matthew, working together at their respective constant rates, start making 50 widgets at 9:00 AM, they will finish by 9:20 AM.
If Matthew, working alone at his constant rate, started making 50 widgets at 10:00 AM, at what time will he finish?

K. 10:30 AM
L. 10:45 AM
M. 11:00 AM
N. 11:30 AM
O. 12:00 PM

35. An aeroplane leaves Tinseltown at 10:30 AM, local time, and reaches Greenville at 2:30 AM, local time.
The same aeroplane leaves Greenville at 4:30 PM, local time, and reaches Tinseltown at 4:30 AM, local time.
If the aeroplane takes the same route on both flights and at the same speed, what is the time difference between the local times of Tinseltown and Greenville?

P. 1 hour 30 minutes
Q. 2 hours
R. 2 hours 30 minutes
S. 3 hours
T. 3 hours 30 minutes

36. The population of the City of Townsville increases by 50 percent every 50 years. The City of Townsville had a population of 8.1 million in 2000.
In what year was the population of the City of Townsville 1.6 million?

U. 1700
V. 1750
W. 1800
X. 1850
Y. 1900

37. October 31st, Halloween, fell on a Wednesday in 2001.
On what day of the week did Halloween fall in 2014? (Note: 2004, 2008, and 2012 are leap years, and thus, had 366 days in a year.)

Z. Monday
AA. Tuesday
BB. Wednesday
CC. Thursday
DD. Friday

38. A water pump started filling an empty water tank at a constant rate.
By noon, the water tank was one-third full, and by 1:15 PM, the water tank was three-fourths full.
At what time will the water tank be full?

EE. 2:00 PM
FF. 2:15 PM
GG. 2:30 PM
HH. 2:45 PM
II. 3:00 PM

39. What fraction of an hour had elapsed between 6:55 AM and 7:19 AM?

JJ. 25
KK. 730
LL. 1730
MM. 16
NN. 14

40. The red light flashes once every 9 minutes and the yellow light flashes once every 24 minutes.

If the red light and the yellow light flash at the same time at 7:00 AM, which of the following times will the two lights flash at the same time again?

A. 7:35 AM
B. 8:16 AM
C. 9:36 AM
D. 11:48 AM
E. 12:00 PM

41. Gerry can run 3.75 kilometres in 15 minutes.

In how many minutes will it take him to run 1 kilometre at the same average speed?

A. 1 minute
B. 2 minutes
C. 3 minutes
D. 4 minutes
E. 5 minutes

42. Yesterday, Agnes spent 30 minutes walking 3 kilometres.

If she doubles her average speed today, how far will she walk in one hour?

A. 1 kilometre
B. 3 kilometres
C. 6 kilometres
D. 12 kilometres
E. 24 kilometres

43. A cab driver drove 2 hours less and at an average speed of 5 kilometres per hour faster on Tuesday than he drove on Monday.
During the two days, the cab spent a total of 20 hours driving a total distance of 1245 kilometres.
What was the cab driver's average speed on Monday?

F. 55 kilometres per hour
G. 58 kilometres per hour
H. 60 kilometres per hour
I. 62 kilometres per hour
J. 65 kilometres per hour

44. Jane left the museum, heading north, at a rate of 9 kilometres per hour at 9:00 AM.
At 9:15 AM, Ben also left the museum, heading in the same direction as Jane, at a rate of 36 kilometres per hour.

How many kilometres must Ben travel before he catches up with Jane?

K. 1 kilometre
L. 3 kilometres
M. 4 kilometres
N. 9 kilometres
O. 12 kilometres

45. Hank drove to a friend's house, who lived 30 kilometres away from his house, last weekend.
On his way back, Hank drove twice as fast as he did on his way to his friend's house.

If Hank spent a total of 6 hours driving, what was his average speed on his way back from his friend's house?

P. 5 kilometres per hour
Q. 10 kilometres per hour
R. 14 kilometres per hour
S. 15 kilometres per hour
T. 20 kilometres per hour

46. A van and a bus are 100 kilometres apart on a parallel highway.
At 8:00 AM, the van starts travelling toward the bus at an average speed of 60 kilometres per hour.

Half an hour later, the bus starts travelling toward the van at an average speed of 40 kilometres per hour.

How many kilometres will the bus travel before it passes the van on the highway?

U. 25 kilometres
V. 28 kilometres
W. 33 kilometres
X. 35 kilometres
Y. 40 kilometres

47. Leo spent 6 minutes walking from his house to the park.
On his way back home from the park, his average speed is half his average speed on his way to the park.
How much time will it take Leo to travel two round trips to the park?

Z. 36 minutes
AA. 30 minutes
BB. 24 minutes
CC. 18 minutes
DD. 12 minutes

48. Sheila drove to the supermarket at an average speed of 40 kilometres per hour and then drove back home following the same route.

If Sheila's average speed for the entire journey was 30 kilometres per hour, what was her average speed returning home from the supermarket?

A. 20 kilometres per hour
B. 22 kilometres per hour
C. 24 kilometres per hour
D. 26 kilometres per hour
E. 28 kilometres per hour

49. A bee flew for three straight hours.

During the first hour, the bee flew a total distance of 86 metres, which was 25 percent farther than it flew during the second hour.

During the third hour, the bee flew at an average speed of 120 metres per hour for 20 minutes.

What was the total distance that the bee flew during the three hours?

A. 190.6 metres
B. 194.8 metres
C. 198.2 metres
D. 204.5 metres
E. 212.8 metres

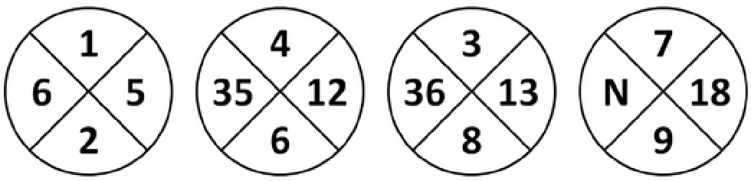
50. The hare, who can run 50 percent faster, challenges the turtle in a 75-metre race.

During the race, the hare had to stop by the cabbage patch to have a snack and lost 12.5 minutes.

If both the hare and the turtle left the starting line at the same time and reach the finish line at the same time, how fast was the turtle running?

A.100 metres per hour
B.110 metres per hour
C.120 metres per hour
D.130 metres per hour
E.230 metres per hour

51. The numbers in the four circles below follow the same pattern.



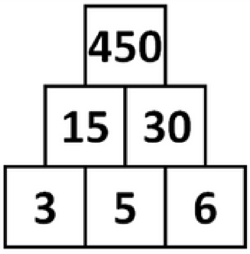
What number is N?

A. 40
B. 44
C. 60
D. 72
E. 80

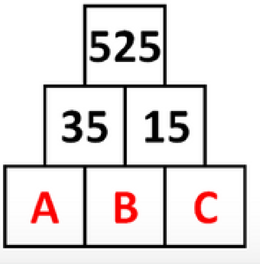
52. The passcode to a lock is a three-digit number whose hundreds digit is equal to the sum of the tens digit and the ones digit.
How many possible passcodes are there?

A.54
B.45
C.36
D.27
E.18

53.



The pattern of the numbers in the pyramid above is repeated in the pyramid below.



What is the value of A + B + C?

F. 3
G. 5
H. 7
I. 15
J. 25

54. Ruby was making 10 bracelets for her friends.

The first bracelet she made contained 5 beads, the second bracelet contained 7 beads, and each succeeding bracelet contained two more beads than the previous bracelet she made.

What is the total number of bracelets she made?

K. 138 beads
L. 139 beads
M. 140 beads
N. 156 beads
O. 165 beads

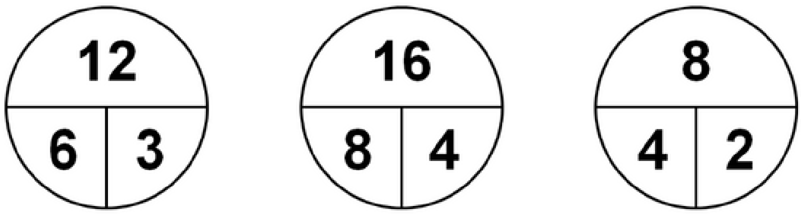
55. A grocery store worker arranged a total of 120 cans of beans into a stack.

The worker had 1 can of beans on the top of the stack, 3 cans of beans in the second layer, 6 cans of beans in the third layer, 10 cans of beans in the fourth layer, and so on.

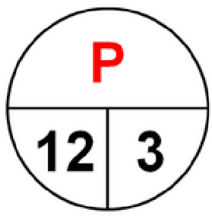
How many layers of cans of beans did the stack have?

P.7 layers
Q.8 layers
R.9 layers
S.10 layers
T.12 layers

56. The numbers in the three circles below follow a pattern.



If the pattern of the numbers in the circles above is repeated in the circle below, what is the value of **P**?



U. 6
V. 12
W. 24
X. 48
Y. 60

57. The ten houses on one side of Emerald Street are numbered in consecutive even numbers.

The houses are numbered in increasing order from left to right.

If the sum of the numbers of the ten houses in that row is 170, what is the number of the sixth house from the left?

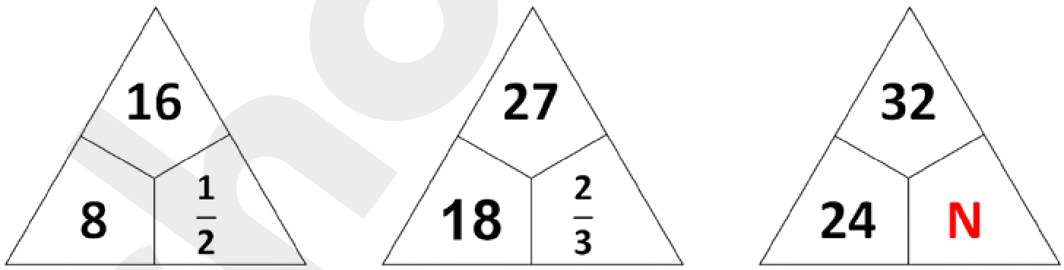
A.8
B.10
C.12
D.16
E.18

58. George created a number pattern following a certain rule.

The first number in his pattern is -5 and the second number is 5.
Each subsequent number in the odds place is found by adding 5 to the previous number.
Each subsequent number in the evens place is found by multiplying the previous number by -1.
What is the sum of the first 449 numbers in George's number pattern?

Z. -10
AA. -5
BB. 0
CC. 5
DD. 10

59. The numbers in the three triangles below follow the same pattern.



What number is **N**?

EE. 14
FF. 13
GG. 34
HH. 3
II. 4

60. Mark wrote a number pattern of 16 consecutive integers.

The least integer in his pattern is -10.

What is the range of all the positive integers in Mark's number pattern?

JJ. 4
KK. 1
LL. 0
MM. -1
NN. -5

61. A jar contains a total of 56 marbles, each of which is either coloured red, white, or blue.

The ratio of the number of red marbles to the number of white marbles to the number of blue marbles in the jar is 9:**N**:3.

If there are 12 blue marbles in the jar, what is the value of **N**?

A. 0
B. 2
C. 4
D. 8
E. 36

62. At the start of the hour, the ratio of the number of men to the number of women in the room was 2 to 5.

By the end of the hour, no one left the room and two men went into the room.

If by the end of the hour, the ratio of the number of men to the number of women in the room was 1 to 2, which of the following was the number of men in the room at the start of the hour?

A. 1
B. 2
C. 4
D. 8
E. 10

63. A display shelf at the supermarket only shows shampoos and conditioners.

The number of large bottles of shampoo on the shelf is 35, less than 3 times the number of small bottles of shampoo.

The ratio of the number of small bottles of shampoo to the number of large bottles of conditioner is 5 to 4.

If the display shelf has a total of 280 bottles, 205 of which are bottles of shampoo, how many small bottles of conditioner are there?

F. 20 bottles
G. 27 bottles
H. 48 bottles
I. 60 bottles
J. 87 bottles

64. On a certain day, the bakeshop sold a total of 500 donuts and muffins in the ratio of 2 to 3, respectively.

The ratio of the number of chocolate donuts to the number of chocolate muffins the bakeshop sold on that day was 1 to 2.

If the bakeshop sold a total of 6 chocolate donuts and muffins on that day, what was the number of non-chocolate donuts the bakeshop sold?

A. 2
B. 4
C. 6
D. 20
E. 198

65. The initial ratio of the number of coins that Andrew has to the number of coins that Ben has is 5 to 3.

Andrew decides to give 10 of his coins to Ben, and the ratio of the number of coins that Andrew has to the number of coins that Ben has becomes 7 to 5.

How many more coins does Andrew have now than Ben?

A. 30 coins
B. 40 coins
C. 60 coins
D. 80 coins
E. 90 coins

66. Mike and Noel shared a certain number of baseball cards such that for every 5 baseball cards that Mike gets, Noel gets 3 baseball cards.

If the number of baseball cards that Mike gets is 100 more than 59 of the total number of baseball cards, how many baseball cards does Noel get?

A. 420 baseball cards
B. 540 baseball cards
C. 640 baseball cards
D. 750 baseball cards
E. 900 baseball cards

67. A jar contains 5-cent coins, 10-cent coins, and 20-cent coins only in the ratio of 2:5:7, respectively.

If the total value of the coins in the jar is $8, how many 20-cent coins are in the jar?

A. 8
B. 20
C. 28
D. 36
E. 52

68. The current ratio of the number of roses to the number of lilies in Minerva's garden is 12 to 25.

What is the expected number of defective widgets in a shipment containing 630 million widgets?

K. 20
L. 24
M. 29
N. 30
O. 33
H. 60
I. 125
J. 185

69. The table below summarizes the number of defective widgets in four shipments and the total number of widgets in those shipments.

SHIPMENT	NUMBER OF DEFECTIVE WIDGETS	TOTAL NUMBER OF WIDGETS
1	2	50 million
2	6	135 million
3	8	165 million
4	4	70 million

The ratio of the number of defective widgets to the total number of widgets in all future shipments is expected to be equal to the corresponding ratio of shipments 1, 2, 3, and 4 combined, as shown in the table.

What is the expected number of defective widgets in a shipment containing 630 million widgets?

K. 20
L. 24
M. 29
N. 30
O. 33

70. The current ratio of the number of junior managers to the number of senior managers in a certain company is 5 to 3.

If 10 of the junior managers are promoted to senior managers, the ratio becomes 7 to 5.

What is the current number of junior managers in the company?

A. 30 junior managers
B.90 junior managers
C. 140 junior managers
D. 150 junior managers
E. 240 junior managers

71. The dimensions of a rectangle are 24 centimetres and 50 centimetres.

What is the area, in square metres, of the rectangle?

A. 0.012 square metres
B. 0.12 square metres
C. 1.2 square metres
D. 12 square metres
E. 1 200 square metres

72. The dimensions of a picture are 15 centimetres and 24 centimetres.

The picture has a margin of 3 centimetres wide at the top and the bottom, and a margin of 2 centimetres wide on each side.

What is the total area of the margin of the picture?

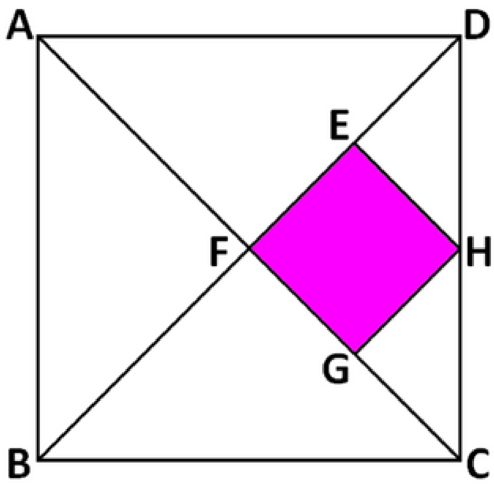
F. 138 square centimetres
I. 162 square centimetres
J. 180 square centimetres
K. 186 square centimetres
L. 198 square centimetres

73. The area of a square is equal to the area of the rectangle.

Which of the following statements is true about the perimeter of the square and the perimeter of the rectangle?

A. Half the perimeter of the square is equal to the perimeter of the rectangle.
B. The perimeter of the square is equal to the perimeter of the rectangle.
C. Twice the perimeter of the square is equal to the perimeter of the rectangle.
D. Three times the perimeter of the square is equal to twice the perimeter of the rectangle.
E. None of the above.

74. In the figure below, **ABCD** is a square.

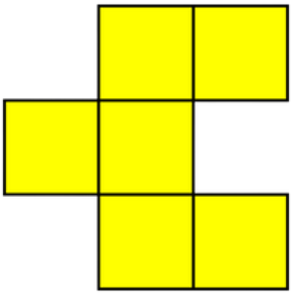


Point **H** is the midpoint of side **CD**, and **E** and **G** are the midpoints of **DF** and **CF**, respectively.

The area of the coloured region is what percent the area of square **ABCD**?

A. 1623 percent
B. 1212 percent
C. 12 percent
D. 812 percent
E. 8 percent

75. The figure below is composed of six identical squares.

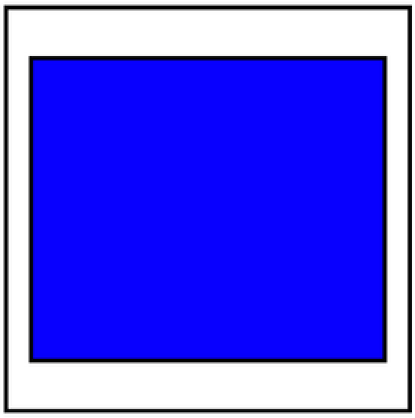


The number of square centimetres in the area of the figure is equal to the number of centimetres in the perimeter of the figure.

What is the length of the side of the square making up the figure?

F. 1 centimetre
G. 123 centimetres
H. 2 centimetres
I. 213 centimetres
J. 212 centimetres

76. The figure below shows a rectangle inside a square.



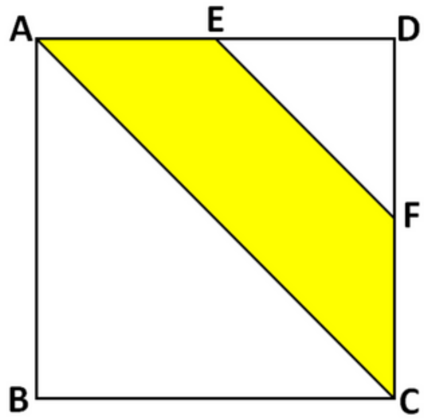
The rectangle has an area of 48 square centimetres.

Each of the margins at the top and the bottom of the rectangle is 3 centimetres wide, and each of the margins on both sides is 2 centimetres wide.

What is the length of the side of the square enclosing the rectangle?

K. 8 centimetres
L. 10 centimetres
M. 12 centimetres
N. 16 centimetres
O. 18 centimetres

77. In the figure below, ABCD is a square with a side of 1 centimetre.



If E and F are the midpoints of sides AD and CD, respectively, what is the area of the coloured region?

P. 18 square centimetres
Q. 14 square centimetres
R. 38 square centimetres
S. 58 square centimetres
T. 23 square centimetres

78. The length of the shorter side of a rectangular garden is 75 percent the length of the longer side.

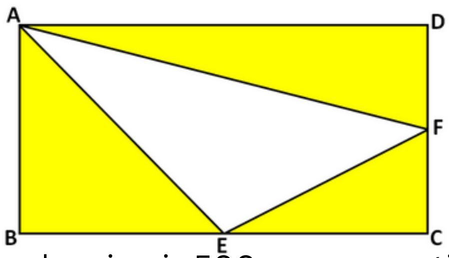
If the perimeter of the garden is 28 metres, what is the area of the garden?

U. 16 square metres
V. 18 square metres
W. 24 square metres
X. 36 square metres
Y. 48 square metres

79. The outside perimeter of a square frame is 360 centimetres.
Each of the sides of the frame is 10 centimetres wide.
What is the inner perimeter of the frame?

Z. 270 centimetres
AA. 275 centimetres
BB. 280 centimetres
CC. 315 centimetres
DD. 320 centimetres

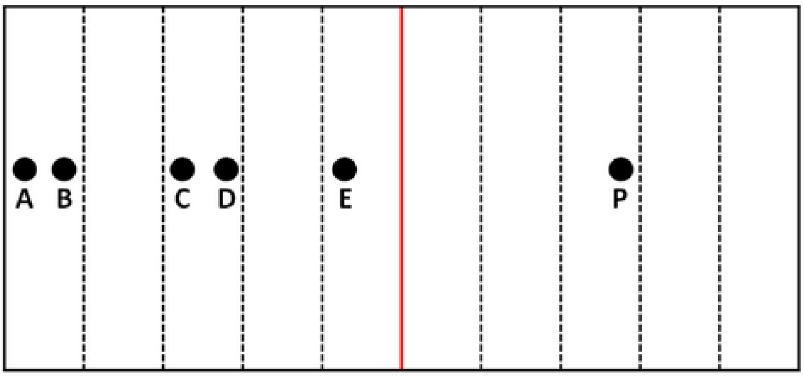
80. In the figure below, ABCD is a rectangle, and E and F are midpoints of the sides BC and CD, respectively.



If the area of the coloured region is 500 square centimetres, what is the area of rectangle ABCD?

EE. 800 square centimetres
FF. 850 square centimetres
GG. 900 square centimetres
HH. 1 000 square centimetres
II. 1 200 square centimetres

81. The figure below shows a strip of paper that is divided into ten smaller rectangles of equal size.
The strip is folded vertically along the red line.
Point P will most likely coincide with which of these points?

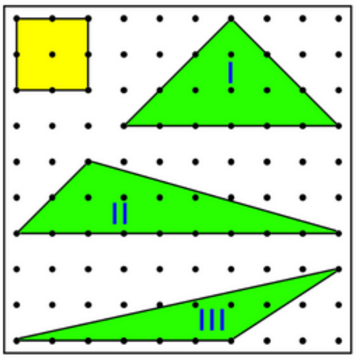


A. Point A
B. Point B
C. Point C
D. Point D
E. Point E

82. How many lines of symmetry does an equilateral triangle have?

F. One
G. Two
H. Three
I. Four
J. Six

83. The markers in the grid below are evenly spaced.

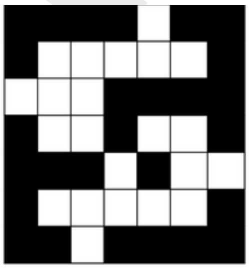


The yellow square has an area of 4 square units.

Which of the three triangles has an area of 9 square units?

K. I only
L. II only
M. III only
N. I and II only
O. II and III only

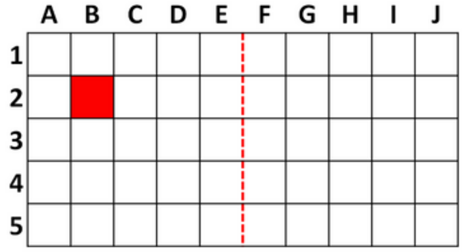
84. Frank is making a crossword puzzle.
His partially completed crossword puzzle is shown below.



If he wants his crossword puzzle to have a half-turn symmetry, what is the least number of squares he still needs to colour black?

P. One
Q. Two
R. Three
S. Four
T. Six

85. The grid below is composed of identical squares.



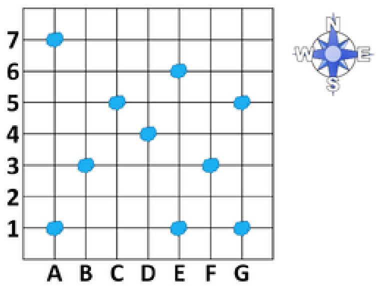
If the grid will be folded vertically along the dashed line, the red square will most likely coincide with which of these squares?

U. G2
V. G3
W. H2
X. H4
Y. I2

86. How many lines of symmetry does an isosceles triangle have?

Z. None
AA. One
BB. Two
CC. Three
DD. Six

87. The figure below shows the location of ten floating icebergs at sea.

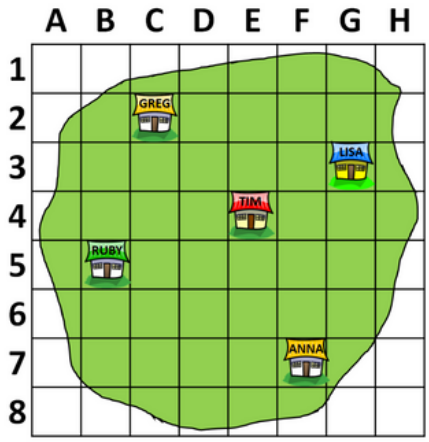


A boat is located at G7 and there is a colony of walruses on the iceberg directly to the southwest of the boat.

What is the grid reference of the location of the iceberg where the colony of walruses is located?

EE. A1
FF. B3
GG. D4
HH. E1
II. F3

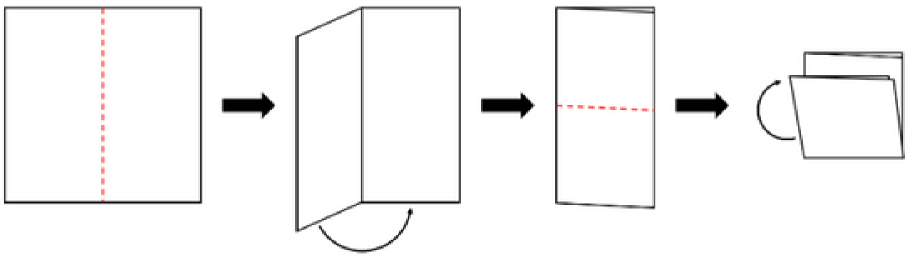
88. The grid below shows the locations of the houses of five friends on the island.



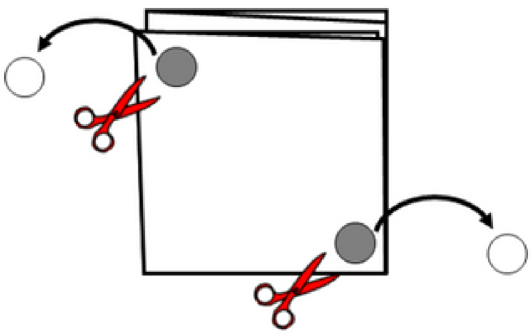
Whose house is located at F7?

JJ. Anna
KK. Greg
LL. Lisa
MM. Ruby
NN. Tim

89. Lisa folded a square piece of paper in half and then folded it again, as shown in the figure below.

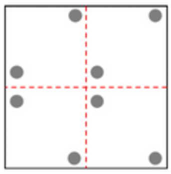


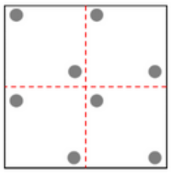
Then, two small circles are cut out of the folded paper, as shown below.

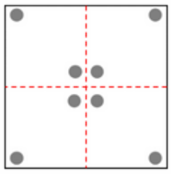


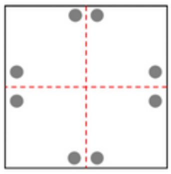
The paper is then unfolded, and placed in the same way as shown originally.

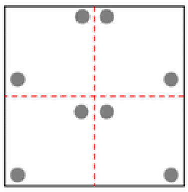
Which of the following shows the cut paper when unfolded?

OO. 

PP. 

QQ. 

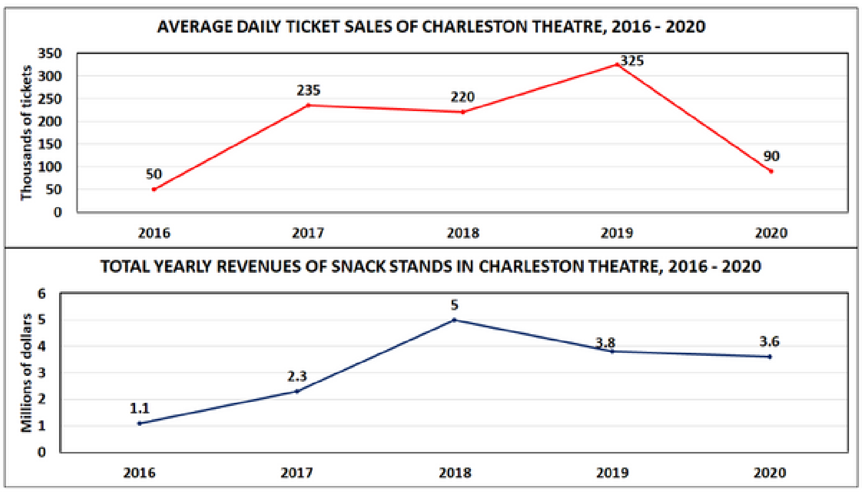
RR. 

SS. 

90. How many lines of symmetry does a rectangle have?

TT. None
UU. One
VV. Two
WW. Three
XX. Six

91. The line graphs below show the average daily ticket sales and total yearly revenues of snack stands in Charleston Theatre from 2016 to 2020.

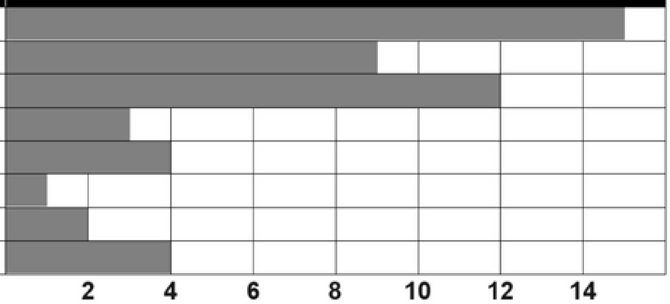


In 2020, the total number of dollars of the revenues of the snack stands in Charleston Theatre was how many times as great as the average daily number of tickets sold?

A.400 times
B.200 times
C.80 times
D.40 times
E.20 times

92. All 50 districts in King's Landing are categorized into district categories based on population.
The data presented below summarizes how all 50 districts are categorized based on their population.

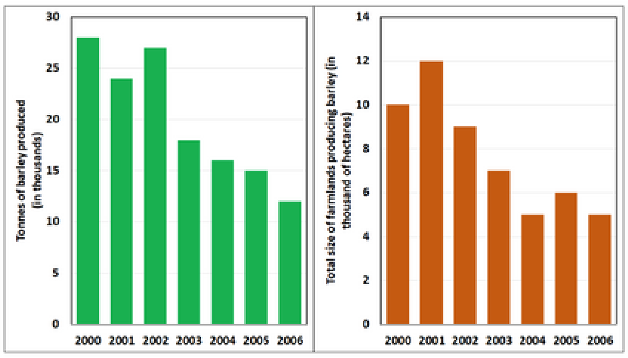
DISTRICT CATEGORY	POPULATION (in thousands)	NUMBER OF DISTRICTS
1	0 to 1.9	
2	2 to 3.9	
3	4 to 5.9	
4	6 to 7.9	
5	8 to 9.9	
6	10 to 11.9	
7	12 to 13.9	
8	14 and over	



What percentage of all the districts in King's Landing belongs to categories 1 to 5?

F. 43 percent
G. 86 percent
H. 88 percent
I. 92 percent
J. 96 percent

93. The bar graphs below show the total barley produced and the total size of farmlands producing barley from 2000 to 2006.



In 2005, what is the average (arithmetic mean) number of tonnes of barley produced per hectare of farmland producing barley?

In 2005, what is the average (arithmetic mean) number of tonnes of barley produced per hectare of farmland producing barley?

K. 1 tonne
L. 1.5 tonnes
M. 2 tonnes
N. 2.5 tonnes
O. 3 tonnes

94. The table below shows the worldwide production of car parts and accessories from 2002 to 2010.

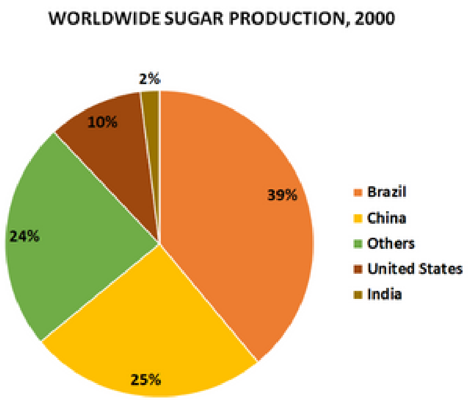
COUNTRY	2002		2004		2006		2008		2010	
	Value	% of Total	Value	% of Total	Value	% of Total	Value	% of Total	Value	% of Total
United States	2,691	62.3	2,975	63.7	3,248	65.1	3,424	65.1	3,438	63.2
China	678	15.7	752	16.1	793	15.9	831	15.8	876	16.1
Japan	376	8.7	383	8.2	384	7.7	426	8.1	457	8.4
Germany	177	4.1	159	3.4	180	3.6	179	3.4	201	3.7
South Korea	125	2.9	140	3.0	135	2.7	153	2.9	169	3.1
Canada	125	2.9	103	2.2	105	2.1	100	1.9	125	2.3
United Kingdom	99	2.3	103	2.2	95	1.9	100	1.9	114	2.1
Others	49	1.1	55	1.2	50	1.0	47	0.9	60	1.1
TOTAL	**4,320**	**100**	**4,670**	**100**	**4,990**	**100**	**5,260**	**100**	**5,440**	**100**

All the values given in the table are in millions of dollars.

From 2006 to 2010, the value of car parts and accessories produced by Japan increased by approximately how many percent?

P. 1 percent
Q. 7 percent
R. 16 percent
S. 19 percent
T. 27 percent

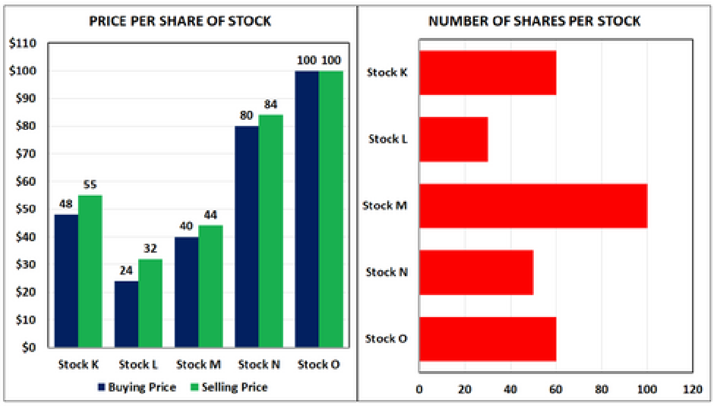
95. The circle graph below shows the worldwide distribution of sugar production in 2000.



If the worldwide production of sugar in 2000 was 750 million tonnes, how many million tonnes of sugar did the United States produce in 2000?

U. 10 million tonnes
V. 25 million tonnes
W. 40 million tonnes
X. 70 million tonnes
Y. 75 million tonnes

96. The bar graphs below show the buying and selling price per share of five stocks, and the number of shares per stock bought.



Which stock did the total dollar value have the greatest dollar value increase between buying and selling of the measured period?

Z. Stock K
AA. Stock L
BB. Stock M
CC. Stock N
DD. Stock O

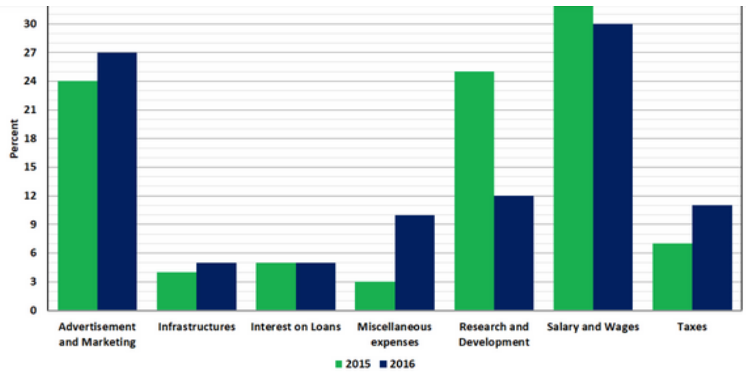
97. The data presented below shows the heights, in metres, of the 43 buildings in a certain district.

16 to 16.4	16.5 to 16.9	17 to 17.4	17.5 to 17.9	18 to 18.4	18.5 to 18.9	19 to 19.4
				18.3		
				18.3		
				18.3		
				18.3		
				18.3		
				18.3		
		17.4	17.9	18.3	18.9	
		17.3	17.8	18.3	18.8	
		17.3	17.8	18.2	18.8	
		17.3	17.8	18.2	18.8	
		17.3	17.8	18.2	18.7	
		17.1	17.7	18.2	18.5	
	16.8	17	17.5	18	18.5	19.3
16.3	16.8	17	17.5	18	18.5	19.3

What is the range of the heights of the 43 buildings in the district?

EE. 3 metres
FF. 6 metres
GG. 16.3 metres
HH. 18.2 metres
II. 19.3 metres

98. The bar graph below shows All Night Supermarket's annual expenses as a percent of its annual gross revenues in 2015 and 2016.

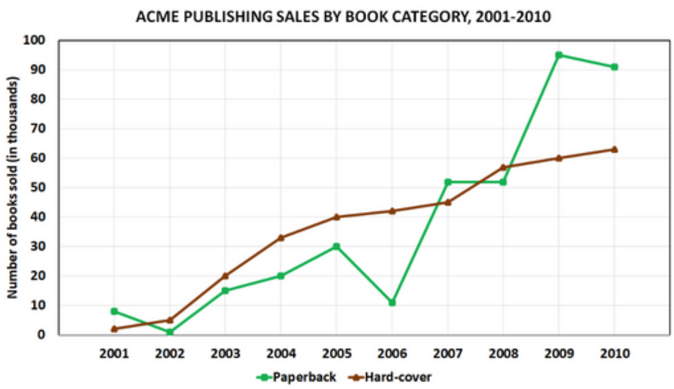


The annual gross revenue of All Night Supermarket in 2015 was $5 million and the total gross revenue in 2016 was $4.5 million.

In 2016, for how many of the seven listed categories were expenses greater than 9 percent of All Night Supermarket's gross annual revenue?

JJ. Two
KK. Three
LL. Four
MM. Five
NN. Six

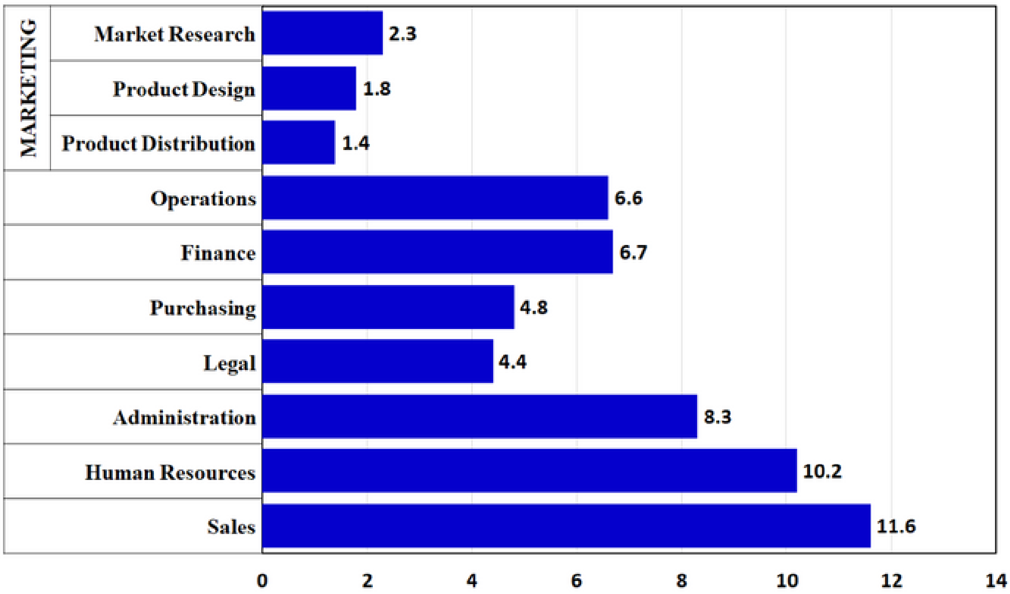
99. The line graph below shows ACME Publishing's sales by book category from 2001 to 2010.



In how many years from 2001 to 2010 did the sales of hard-cover books exceed the sales of paperback books?

OO. Two
PP. Three
QQ. Four
RR. Five
SS. Six

100. The bar graph below shows the number of workers, in hundreds, per department of a certain company.



What is the average (arithmetic mean) number of workers per department of the company?

TT. 444 workers per department
UU. 525 workers per department
VV. 581 workers per department
WW. 612 workers per department
XX. 628 workers per department

Answers

1. A
2. C
3. D
4. D
5. C
6. A
7. C
8. A
9. E
10. B
11. A
12. E
13. A
14. D
15. C
16. B
17. D
18. E
19. B
20. C
21. C
22. C
23. D
24. D
25. B
26. A
27. B
28. B
29. D
30. A
31. E
32. C
33. C
34. C
35. B
36. C
37. E
38. A
39. A
40. D
41. D
42. D
43. C
44. B
45. D
46. B
47. A
48. C
49. B
50. C
51. E
52. A
53. D
54. C
55. B
56. D
57. E
58. B
59. C
60. A
61. B
62. D
63. B
64. E
65. B
66. B
67. C
68. E
69. D
70. D
71. B
72. B
73. E
74. B
75. D
76. C
77. C
78. E
79. C
80. A
81. C
82. C
83. D
84. B
85. E
86. B
87. C
88. A
89. D
90. C
91. D
92. B
93. D
94. D
95. E
96. A
97. A
98. D
99. E
100. C

Scholarly

Steve Xu

Scholarly Publishing