Course Start

Course Start is independent learning you need to complete as a fundamental part of your introduction to the course. It should take you approximately 3 hours to complete.

Course Name	IB SL Maths
How this **Course Start** fits into the first term of the course	*You will need skills and knowledge you gained at GCSE for your chosen IB maths course.* *The topics on this Course Start task make up some of the content that is common to both the SL Applications and Interpretation (AI) and Analysis and Approaches (AA) course. Knowledge and understanding of these specific topics are particularly important in the first term.*
How will my **Course Start** learning be used in lessons?	*You will need to use the skills and knowledge which you have recalled from completing the Course Start task in the first few maths classes of term and at various times in the first term of your IB maths course.*
Course Start learning objectives	*Recall and practice:* • *Coordinate Geometry* • *Pythagoras's Theorem* • *Statistics and Probability* • *Rearranging Formulae*
Study Skills	• Self-evaluation of your level of knowledge and understanding. • Using additional resources to aid understanding if necessary. • Time management of completing a multistage task like this one.

Expectations for: IB DP SL Mathematics (AI and AA)

What this course involves
Recalling, selecting and using mathematical knowledge, skills and understanding.
Developing a curiosity and enjoyment of mathematics
Developing logical and creative thinking, as well as patience and persistence in problem solving.
Using technology to explore new ideas and solve problems.
Communicating mathematics clearly, and working both independently and collaboratively.
By the end of the first term deciding which course (AI or AA) is the best programme for you.
Completing planned study of between 1 and 2 hours per week.
Completing an Exploration-20% of the final grade for your mathematics course.
Preparing for and sitting two 90-minute exams-80% of the final grade for your mathematics course. (The structure of these exams is slightly different for the AI and AA courses).

IB SL Maths Course Start

You will need skills and knowledge you gained at GCSE for your chosen IB maths course.

The topics below make up some of the content that is common to both the SL Applications and Interpretation and Analysis and Approaches courses.

The purpose of this task is to help you retain these skills and knowledge ready for the start of term when you will be expected to use some of them straight away.

Instructions

- Answer the questions below on lined paper and ***bring it along to your first lesson.***
- You may use a calculator.
- Give your answers exactly or to the level of accuracy asked for in the question.
- You must show your working out as your teacher will be interested to see how you approached and set out your solutions as well as the answers.
- If you are unsure about any of these topics you could use any of the resources you used at GCSE, such as mathsgenie, to help.

Coordinate geometry

1

A has coordinates (0, 2). B has coordinates (2, 6).

a Work out the gradient of the line that passes through A and B.

b Find the equation of the line that passes through A and B.

c Find the equation of the line perpendicular to AB that passes through B.
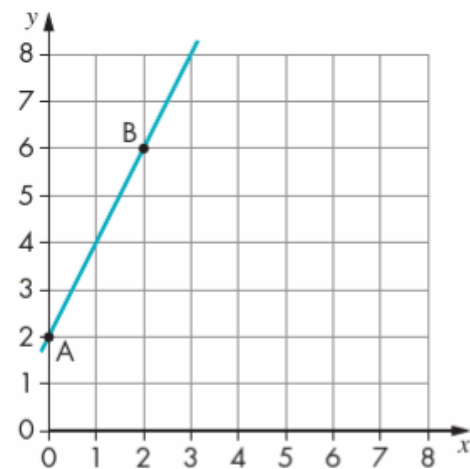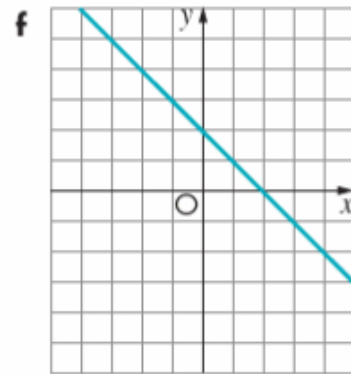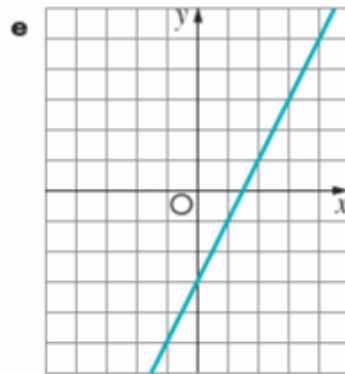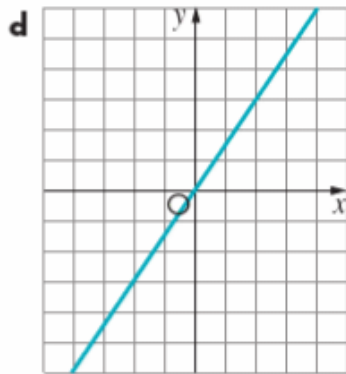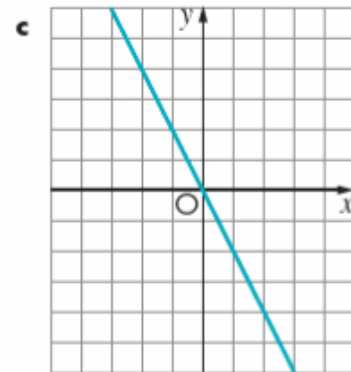
2

Match the equations and the graphs.
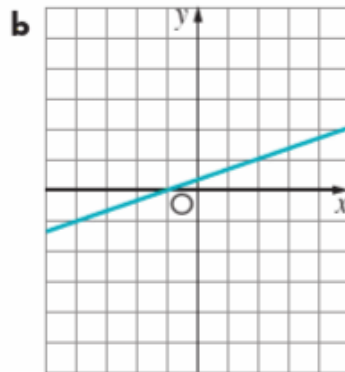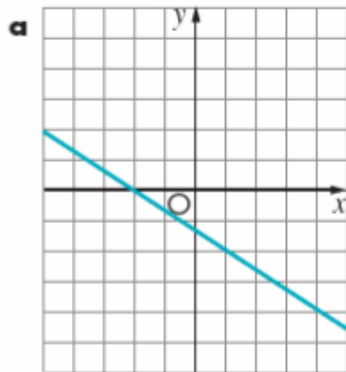
i $y = 2x - 3$ ii $y = 1.5x$ iii $3y = x + 1$

iv $x + y = 2$ v $2x + y = 0$ vi $2x + 3y = -4$

a

b

c

d

e

f

3

Here are the coordinates of the vertices of three quadrilaterals

i A(–2, 3)   B(3, 2)   C(4, 3)   D(–1, 4)

ii A(3, 5)   B(9, 9)   C(7, 12)   D(1, 8)

iii A(0, 3)   B(10, 7)   C(6, 6)   D(1, 4)

a For each one, work out the gradients of AB, BC, CD and DA.

b Determine which quadrilateral is a rectangle, which is a parallelogram and which is a trapezium, explaining your answers.
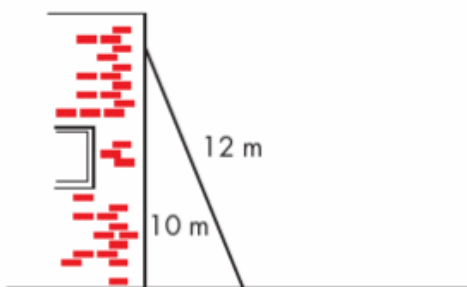
4

Find the equation of the perpendicular bisector of the points A(1, 2) and B(3, 6).

Pythagoras

1

A ladder, 12 m long, leans against a wall. The ladder reaches 10 m up the wall. A ladder is safe if the foot of the ladder is about 2.5 m away from the wall. Is this ladder safe?
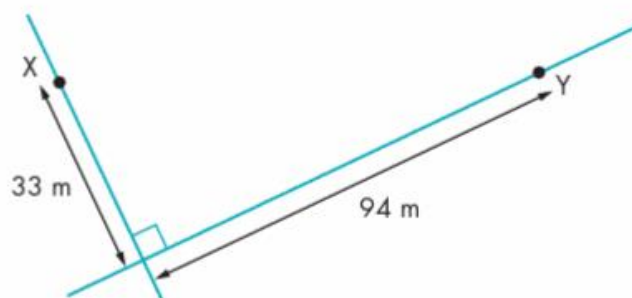

2

Some pedestrians want to get from point X on one road to point Y on another. The two roads meet at right angles.

Instead of following the roads, they decide to follow a footpath that goes directly from X to Y.

How much shorter is this route?

3

A model football pitch is 2 m long and 0.5 m wide. How long is the diagonal?
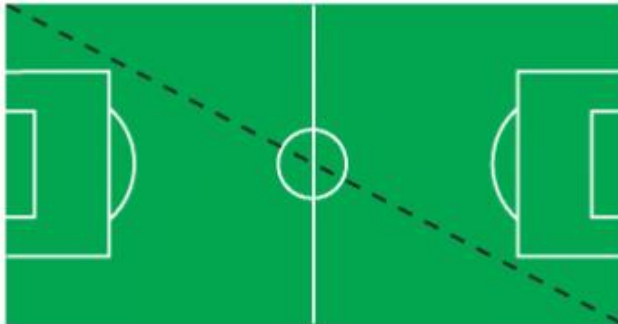
4

A and B are two points on a coordinate grid. They have coordinates (13, 6) and (1, 1). Show that the line that joins them has length 13 units.

5

The spiral in the figure is made by starting with a right-angled triangle with both legs of length 1 unit.

Find the length of x.

Statistics and Probability
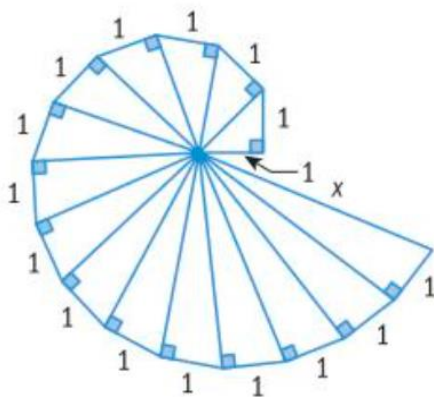
1

Mrs James set her class an end-of-course test with two papers, A and B. She plotted cumulative frequency curves for the results.
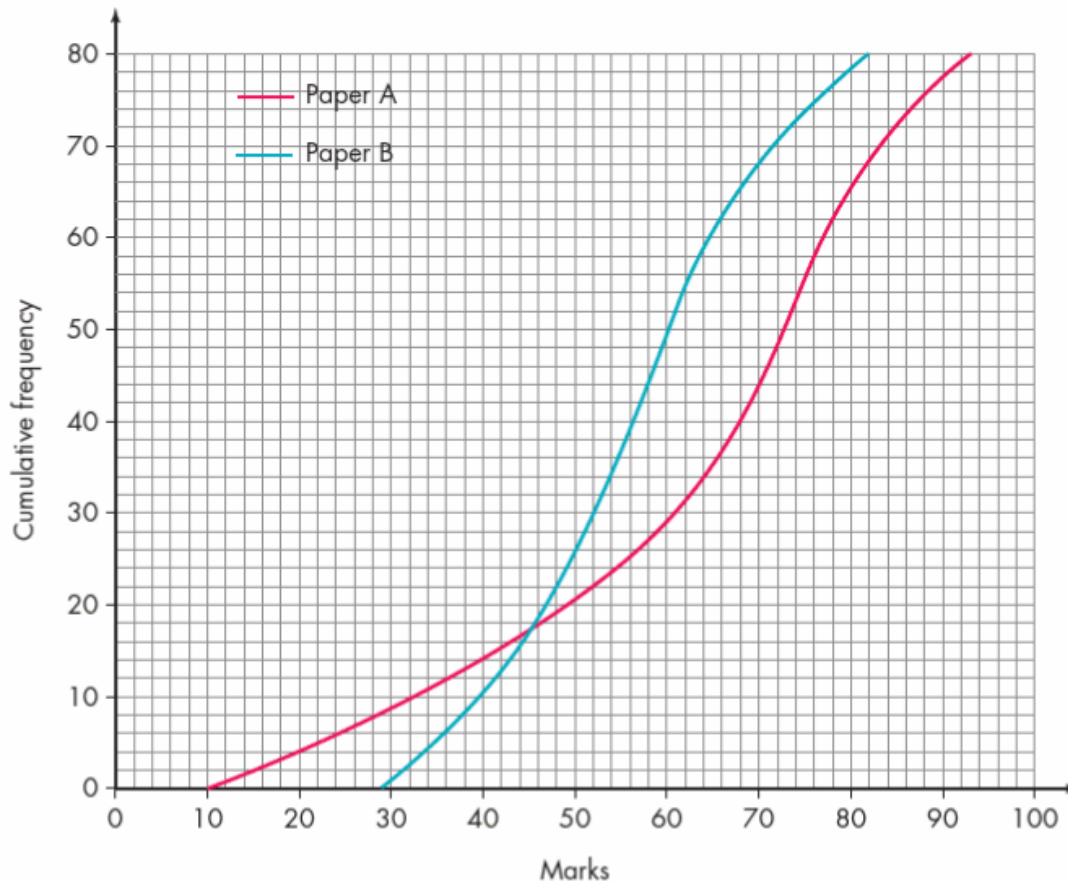
a What is the median score for each paper?

b What is the interquartile range for each paper?

c Which is the harder paper? Explain how you know.

d Mrs James wanted 80% of the students to pass each paper and 20% of the students to get a top grade in each paper.

What marks for each paper give:

i a pass **ii** the top grade?

2

The box plots for the noon temperature at two resorts, recorded over a year, are shown on the graph below.
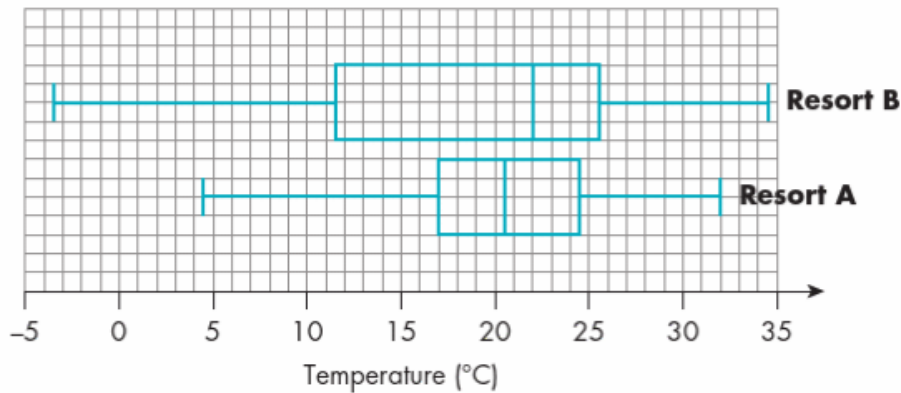
a Comment on the differences in the two distributions.

b Misha wants to go on holiday in July. Which resort would you recommend and why?

3

The mean age of a group of eight walkers is 42. Joanne joins the group and the mean age changes to 40. How old is Joanne?

4

A list comprises seven even numbers. The largest number is 24. The smallest number is half the largest. The mode is 14 and the median is 16. Two of the numbers add up to 42.

a What are the seven numbers?

b How many different answers can you find?

5

The scatter diagrams show the results of a survey on the average number of hours of sunshine in a week during the summer in Eastbourne.

a

Diagram A

Average hours of sunshine

b

Diagram B

Average hours of sunshine

c

Diagram C

Average hours of sunshine
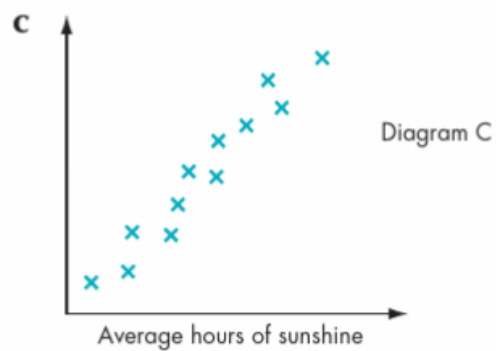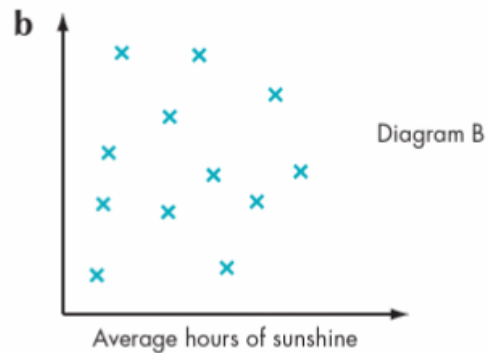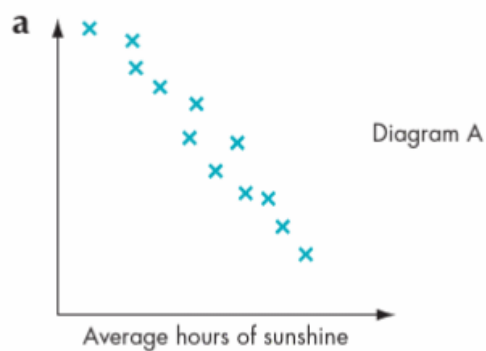
a Which scatter diagram do you think shows the average hours of sunshine plotted against:

   i the number of ice creams sold

   ii the number of umbrellas sold

   iii the number of births in the town?

b Describe the correlation shown in each diagram.

6

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6 ┤   7   8   9   10  11  12
5 ┤   6   7   8   9   10  11
4 ┤   5   6   7   8   9   10
3 ┤   4   5   6   7   8   9
2 ┤   3   4   5   6   7   8
1 ┤   2   3   4   5   6   7
  └──────────────────────────►
      1   2   3   4   5   6
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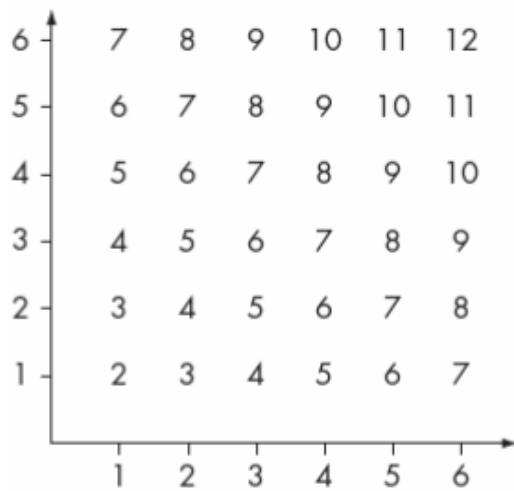
Sasha throws two fair dice, each numbered from 1 to 6.

a What is the most likely score?

b Which two scores are least likely?

c Copy and complete the table to show the probabilities of all scores from 2 to 12.

Score	2	3	4	5	6	7	8	9	10	11	12
Probability											

d What is the probability of a score that is:

i bigger than 10 **ii** from 3 to 7 inclusive **iii** even

iv a square number **v** a prime number **vi** a triangular number?

7

An engineering test is made up of two parts: a written test and a practical test. It is known that 90% of those who take the written test pass. When a person passes the written test, the probability that they will also pass the practical test is 60%. When a person fails the written test, the probability that they will pass the practical test is 20%.

a What is the probability that someone passes both tests?

b What is the probability that someone passes one test?

c What is the probability that someone fails both tests?

d Explain how you could check your answers to parts **a**, **b** and **c**.

Rearranging Formulae

1 $T = 3k$ Make k the subject.

2 $X = y - 1$ Express y in terms of X.

3 $Q = \frac{p}{3}$ Express p in terms of Q.

4 $A = 4r + 9$ Make r the subject.

5 $p = m + t$ **a** Make m the subject.   **b** Make t the subject.

6 $g = \frac{m}{v}$ Make m the subject.

7 $t = m^2$ Make m the subject.

8 $P = 2l + 2w$ Make l the subject.

9 $m = p^2 + 2$ Make p the subject.

10 The formula for converting degrees Fahrenheit to degrees Celsius is $C = \frac{5}{9}(F - 32)$.

     a Show that when $F = -40$, C is also equal to -40.

     b Find the value of C when $F = 68$.

     c Use this flow diagram to establish the formula for converting degrees Celsius to degrees Fahrenheit.

     $°F \longrightarrow \boxed{-32} \longrightarrow \boxed{\times 5} \longrightarrow \boxed{\div 9} \longrightarrow °C$

11 Distance, speed and time are connected by the formula:

     distance = speed × time.

     A delivery driver drove 126 km in 1 hour and 45 minutes. On the return journey, he was held up at some road works so his average speed decreased by 9 km per hour.

     How long was he held up at the road works?

12 Given that $C = 2\pi r$ and $A = \pi r^2$, show that $A = \dfrac{C^2}{4\pi}$

13 Kieran notices that the price of five cream buns is 75p more than the price of nine mince pies.

Let the price of a cream bun be x pence and the price of a mince pie be y pence.

a Based upon Kieran's observation, express the cost of one mince pie, y, in terms of the price of a cream bun, x.

b The price of a cream bun is 60p and the price of a mince pie is 25p. Check your formula is correct.

Marlon states that the price of seven cream buns is 40p more than the price of ten mince pies.

c Based upon Marlon's statement, express the cost of one mince pie, y, in terms of the price of a cream bun, x.

d Given the prices of the cream bun and mince pie, evaluate whether or not Marlon's statement is correct.

> **Hints and tips** Set up a formula, using the first sentence of information, then rearrange it.

14 $v = u + at$ **a** Make a the subject.   **b** Make t the subject.

15 $A = \frac{1}{4}\pi d^2$ Make d the subject.

16 $x = 5y - w$ **a** Make y the subject.   **b** Express w in terms of x and y.