Corbettmaths

Ultimate GCSE Higher Revision Question Booklet

Revision Video

Answers

Contents

Adding & Subtracting Fractions - Video 133

1. Work out $\frac{5}{8}+\frac{1}{3}$

$\frac{15}{24} + \frac{8}{24}$

$\frac{23}{24}$

2. Work out $\frac{7}{15}-\frac{3}{10}$

$\frac{14}{30} - \frac{9}{30} = \frac{5}{30}$

$\frac{1}{6}$

3. Work out $5\frac{1}{4}+1\frac{2}{5}$

$\frac{21}{4} + \frac{7}{5}$

$\frac{105}{20} + \frac{28}{20} = \frac{133}{20}$

$6\frac{13}{20}$

Multiplying Fractions - Video 142

4. Work out $\frac{1}{2}\times\frac{2}{3}$

$\frac{2}{6}$

$\frac{1}{3}$

5. Work out $\frac{3}{8}\times1\frac{2}{5}$

$\frac{3}{8} \times \frac{7}{5} = \frac{21}{40}$

$\frac{21}{40}$

Dividing Fractions - Video 134

6. Work out $\frac{3}{4}\div\frac{9}{10}$

$\frac{3}{4} \times \frac{10}{9} = \frac{30}{36}$

$= \frac{5}{6}$

$\frac{5}{6}$

Reciprocals - Video 145

7. Write down the reciprocal of 20

$\frac{1}{20}$

8. Write down the reciprocal of $\frac{1}{5}$

5

9. Write down the reciprocal of $\frac{3}{8}$

$\frac{8}{3}$ or $2\frac{2}{3}$

10. Write down the reciprocal of $7\frac{1}{2}$

$\frac{15}{2} \rightarrow \frac{2}{15}$

$\frac{2}{15}$

Arithmetic with Decimals - Videos 90, 91, 92, 93, 94

11. Work out 6.15 ÷ 2.497

6.15
2.497
8.647

8.647

12. Work out 7.3 – 2.542

7.3 → 6 12 9
7.300
− 2.542
4.758

4.758

13. Work out 0.9 x 0.012

9 x 12 = 108

0.0108

14. Work out 74.58 ÷ 5

14.916
5 | 74.58

14.916

15. Work out 14.6 ÷ 0.02

1460 ÷ 2 = 730

730

Fractions, Decimals and Percentages - Videos 129, 130

16. Fill in the missing values

Fraction	Decimal	Percentage
$\frac{13}{40}$	0.325	32.5%
$\frac{17}{200}$	0.085	8.5%
$2\frac{4}{5}$ or $\frac{14}{5}$	2.8	280%
$\frac{2}{30} = \frac{1}{15}$	0.0666... $0.0\dot{6}$	6.6% 6.66...%

Recurring Decimals - Video 96a

17. Circle the two fractions below that are recurring when converted to decimals.

$\frac{4}{5}$ $\frac{2}{3}$ $\frac{1}{10}$ $\frac{7}{9}$ $\frac{3}{8}$

Recurring Decimals - Video 96

18. Use algebra to write $0.\dot{3}\dot{8}$ as a fraction.

$x = 0.3838...$
$100x = 38.3838...$

$99x = 38$

$x = \frac{38}{99}$

$\frac{38}{99}$

19. Use algebra to write $0.12\dot{7}$ as a fraction.

$x = 0.127777$

$100x = 12.77777$

$1000x = 127.77777$

$100x = 12.77777$

$900x = 115$

$x = \frac{115}{900}$

$\frac{23}{180}$

Rounding - Video 279a

20. Round 294720 to 3 significant figures

295000

21. Round 0.45218 to 2 significant figures

0.45

Use of a Calculator - Video 352

22. Calculate the value of $\frac{5}{0.8^3 - cos(27°)}$

-13.192385504

Estimation - Video 215

23. Estimate the value of $\frac{49.1 \times 40.4}{9.05 - 5.1}$

$\approx \frac{50 \times 40}{9 - 5}$

$= \frac{2000}{4}$

500

~~Best Buys - Video 210~~

Best Buys - Video 210

24. A shop sells the same type of highlighter in two different packs.
Pack A has 6 highlighters and costs £3.50
Pack B has 9 highlighters and costs £5.30

Which pack is better value for money?

18 highlighters

Pack A : £3.50 x 3 = £10.50

Pack B : £5.30 x 2 = £10.60

Pack A

Exchange Rates - Video 214a

25. Orla went to Spain.
She changed £425 into euros (€).

The exchange rate was £1 = €1.16

Change £425 into euros.

425 x 1.16

€ 493

26. On her return to Belfast, Orla changed €80 into pounds (£).

The new exchange rate was £1 = €1.25

Change €80 into pounds.

80 ÷ 1.25

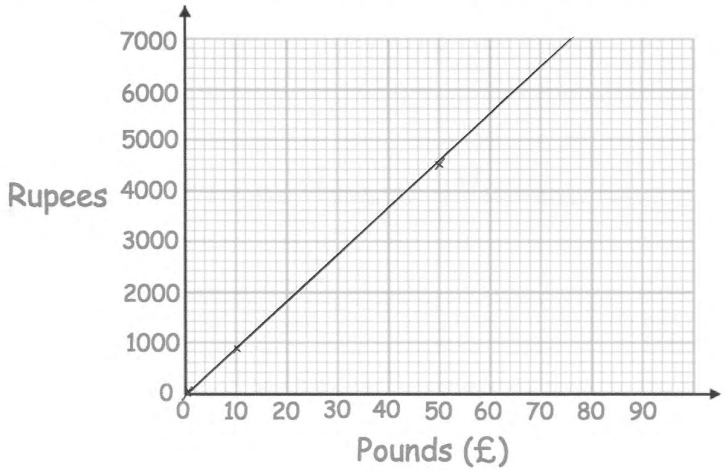
£ 64

Conversion Graphs - Videos 151, 152

27. Complete the table below

Pounds	0	1	10	50
Rupees	0	90	900	4500

Draw a conversion graph for converting between pounds and rupees.



Indices - Video 172

28. Work out 2^4

$2 \times 2 \times 2 \times 2$

16

29. Calculate 9^4

$9 \times 9 \times 9 \times 9$

6561

30. Write $6 \times 6 \times 6 \times 6 \times 6$ in index form

6^5

Laws of Indices - Video 174

31. Write $2^3 \times 2^5$ in the form 2^n

2^8

32. Write $5^{10} \div 5^2$ as a single power of 5

5^8

33. Write $(10^6)^2$ in the form 10^n

10^{12}

Negative Indices - Video 175

34. Work out 5^{-2}

$\frac{1}{5^2}$

$\frac{1}{25}$

35. Work out 10^{-3}

$\frac{1}{10^3}$

$\frac{1}{1000}$

36. Work out $\left(\frac{2}{3}\right)^{-2}$

$\left(\frac{3}{2}\right)^2$

$\frac{9}{4}$

Fractional Indices - Video 173

37. Work out $9^{\frac{1}{2}}$

3

38. Work out $1000^{-\frac{1}{3}}$

$\frac{1}{1000^{\frac{1}{3}}}$

$\frac{1}{10}$

39. Work out $27^{\frac{2}{3}}$

$\sqrt[3]{27} = 3$

3^2

9

40. Work out $32^{-\frac{3}{5}}$

$\frac{1}{32^{\frac{3}{5}}}$

$\sqrt[5]{32} = 2$

$2^3 = 8$

$\frac{1}{8}$

LCM/HCF - Videos 218, 219

41. Find the lowest common multiple of 12 and 15

12 24 36 48 60

15 30 45 60

60

42. Find the highest common factor of 18 and 45

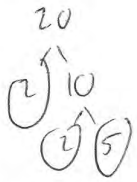
(1) 2 (3) 6 (9) 18

(1) (3) 5 (9) 15 45

9

Product of Primes - Video 223

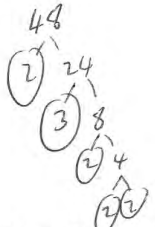
43. Write 20 as a product of primes.
Give your answer in index form.



$2 \times 2 \times 5$

$2^2 \times 5$

44. Write 48 as a product of primes.
Give your answer in index form.



$2 \times 2 \times 2 \times 2 \times 3$

$2^4 \times 3$

45. When a number is written as a product of primes, the answer is $2^2 \times 3^2 \times 5$
What was the number?

$4 \times 9 \times 5$

180

Applying Product of Primes - Video 223a

46. A number, y, written as a product of primes is 5×7^2
Write the number 14y as a product of primes.

$14 = 2 \times 7$

$14y = 5 \times 7^2 \times 2 \times 7$

$= 2 \times 5 \times 7^3$

$2 \times 5 \times 7^3$

47. Given that $120 = 2^3 \times 3 \times 5$

Find the lowest whole number that 120 would need to be multiplied by to give a cube number.

$2^3 \times 3^3 \times 5^3$ is a cube number

$3^2 \times 5^2 = 225$

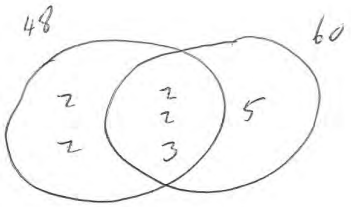
225

Product of Primes - LCM/HCF - Video 224

48. Find the HCF and LCM of 48 and 60

$48 = 2 \times 2 \times 2 \times 2 \times 3$

$60 = 2 \times 2 \times 3 \times 5$



HCF $= 2 \times 2 \times 3 = 12$

LCM $= 2 \times 2 \times 2 \times 2 \times 3 \times 5$

HCF = 12

LCM = 240

Standard Form - Videos 300, 301, 302, 303

49. Write 700000 in standard form

7×10^5

50. Write 28000 in standard form

2.8×10^4

51. Write 0.094 in standard form

9.4×10^{-2}

52. Write 1.7×10^4 as an ordinary number

17000

53. Write 9.2×10^{-3} as an ordinary number.

0.0092

54. Write 450×10^5 in standard form.

4.5×10^7

4.5×10^7

55. Work out $(3.8 \times 10^5) + (1.9 \times 10^6)$

$$\begin{array}{r} 1900000 \\ +\ 380000 \\ \hline 2280000 \end{array}$$

2.28×10^6

56. Work out $(6 \times 10^3) \times (4 \times 10^5)$
Give your answer in standard form.

24×10^8

2.4×10^9

2.4×10^9

57. Work out $(4 \times 10^9) \div (5 \times 10^{-2})$
Give your answer in standard form.

0.8×10^{11}

8×10^{10}

8×10^{10}

Expressing as a Percentage - Video 237

58. Josie scored 19 out of 20 in a test.

Write Josie's result as a percentage.

$\frac{19}{20} = \frac{95}{100}$

95 %

59. There are 29 students in a class.
6 of the students are left handed.

What percentage of the class are left handed?
Give your answer to 1 decimal place.

$\frac{6}{29} = 0.20689655\ldots$

$20.6896\ldots\%$

20.7 %

Percentages of Amounts (Non-Calculator) - Video 234

60. Work out 50% of 18

9

61. Work out 10% of 350

35

62. Work out 25% of 32

8

63. Decrease 90 by 30%

10% → 9

30% → 27

90 - 27 = 63

63

64. Work out 175% of 60

50% → 30

25% → 15

75% → 45

60 + 45

105

Percentages of Amounts (Calculator) - Video 235

65. Work out 3% of 2800

or $2800 \times 0.03 = 84$

2800 ÷ 100 = 28

28 × 3 = 84

84

66. Work out 34% of 700

or $700 \times 0.34 = 238$

700 ÷ 100 = 7

7 × 34 = 238

238

Percentage Change - Video 233

67. Eoin bought an antique for €35
He sold the antique for €49

Work out the percentage profit

$\frac{14}{35} = \frac{2}{5}$

40 %

68. Last year, a football team sold 800 season ticket
This year, the team sold 745 season tickets

Calculate the percentage decrease.

$\frac{55}{800} = 0.06875$

6.875 %

Simple Interest - Video 236a

69. Niamh invests £500 for 2 years at 3% simple interest.
Work out how much interest Niamh earns at the end of the 2 years.

3% of £500 = £15

15 x 2 = £30

£ 30

Multipliers - Video 239

70. Increase 120 by 10%

120 x 1.1 = 132

132

71. Decrease 60 by 25%

60 x 0.75 = 45

45

Compound Interest - Video 236

72. Fiona leaves £1600 in the bank for three years.
It earns compound interest of 4% each year.

Calculate the total amount Fiona has in the bank at the end of the three years.

$1600 \times 1.04^3 = £1799.78$

£ 1799.78

Growth and Decay/Finance - Video 236

73. The value of a motorcycle was £14000 on 1st April 2020.
Every three months the value of the motorcycle decreases by 2% of its value at the start of that three months.

24 ÷ 3 = 8

What was the value of the motorcycle on 1st April 2022?

$14000 \times 0.98^8 = 11910.682...$

£ 11910.68

Reverse Percentages - Video 240

74. The price of a chair is reduced by 20% in a sale.
The sale price of the chair is £20.80

20.80 ÷ 0.8 = £26

What is the normal price of the chair?

or

80% → £20.80
1% → £0.26
100% → £26

£ 26

75. A limited edition bag of sugar contains 35% more than a standard bag.
The limited edition bag contains 702g of sugar.

How much sugar is in the standard bag?

702 ÷ 1.35 = 520g

or
135% → 702
1% → 5.2
100% → 520

520 g

Simplifying Ratio - Video 269

76. Simplify the ratio 84 : 126

42 : 63
2 : 3

2 : 3

Ratio: 1:n or n:1 - Video 271c

There are 180 red pens and 40 black pens in a box.

77. Write down the ratio of red pens to black pens in the box.
Give your answer in the form n : 1

÷40 ↙ 180 : 40 ↘ ÷40
4.5 : 1

4.5 : 1

Forming Ratio - Video 271c

2x x 6x

In a bag, there are red, yellow and blue sweets.
There are twice as many red sweets as yellow sweets.
There are three times as many blue sweets as red sweets.

78. Write down the ratio of the number of red sweets : yellow sweets : blue sweets

2 : 1 : 6

Ratio & Fractions - Video 269a

The ratio of red to white counters in a bag is 3:5

79. What fraction of the counters are red?

3/8

80. What percentage of the counters are white?

5/8 = 0.625
62.5%

62.5%

81. Mark says that there are 72 counters in the bag.
Could Mark be correct?

3 + 5 = 8
72 ÷ 8 = 9

Yes

Sharing in a Ratio - Video 270

82. The ratio of adults to children on a flight is 17:3
There are 160 people altogether on the flight.

How many children are on the flight?

$17+3=20$

$160 \div 20 = 8$

$17 \times 8 = 136$

$3 \times 8 = 24$

24

Given One Quantity - Video 271

83. The ratio of the size of angle A to angle B is 4:9
Angle B is 72°

Find the size of angle A.

$72 \div 9 = 8$

$8 \times 4 = 32$

32 °

Given Two Ratios - Video 271a

84. Given that a : b = 2 : 3 and b : c = 5 : 1

Find a : b : c

a : b : c

2 : 3

5 : 1] ×3 (×5)

10 : 15 : 3

10 : 15 : 3

Ratios and Equations - Video 271a

85. y : x = 5 : 1

Write an equation linking x and y.

$x = \frac{1}{5}y$

or

$y = 5x$

86. x : y = 2 : 5

Write an equation linking x and y.

$2y = 5x$ or $2y = 5x$

$y = \frac{5}{2}x$ $\frac{2}{5}y = x$

$x = \frac{2}{5}y$

or

$y = \frac{5}{2}x$

87. y = 3x

Write the ratio x : y

$y = x$

3 : 1

x : y

1 : 3

1 : 3

Direct Proportion - Video 254

H is directly proportional to the cube of c.
When H = 40, c = 2.

88. Express H in terms of c.

$H \propto c^3$

$H = kc^3$

$40 = k \times 8$

$k = 5$

$H = 5c^3$

89. Find the value of H when c = 5

$H = 5 \times 5^3$

$H = 625$

625

Inverse Proportion - Video 255

q is inversely proportional to the square of t.
When q = 7.5, t = 1.6

$q = \frac{19.2}{t^2}$

90. Calculate the value of q when t = 8

$q \propto \frac{1}{t^2}$ $\quad 7.5 = \frac{k}{2.56}$ $\quad q = \frac{19.2}{8^2}$

$q = \frac{k}{t^2}$ $\quad 19.2 = k$ $\quad = 0.3$

0.3

91. Calculate the value of t when q = 1.875

$1.875 = \frac{19.2}{t^2}$

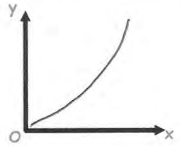
$1.875t^2 = 19.2$

$t^2 = 10.24$

3.2

Proportion Graphs - Video 254

92. Sketch the graph of y is directly proportional to x^2.



Proportion: Time - Video 255c

It takes 5 builders, 8 days to build a wall. $5 \times 8 = 40$

93. How long would it take 2 builders?

$40 \div 2$

20 days

94. State an assumption that you have made in working out your answer.

All workers work at the same rate.

Rounding (Highest/Lowest) - Video 280

There are 6300 jelly beans in a jar to the nearest hundred.

95. Write down the lowest possible number of jelly beans in the jar.

6250

96. Write down the greatest possible number of jelly beans in the jar.

6349

Error Intervals - Video 377

97. Jessica rounds a number, y, to the nearest hundred.
Her result is 2800.

Write down the error interval for y.

$2750 \leq y < 2850$

$2750 \leq y < 2850$

Upper/Lower Bounds - Video 183

73.5m 74.5m

98. A rectangular rugby pitch has a width of 74m, measured to the nearest metre.
The length of the pitch is 115m, measured to the nearest 5 metres.

112.5m 117.5m

Calculate the upper bound for the perimeter.

$74.5m + 74.5m + 117.5m + 117.5m$

384 m

Applying Bounds - Video 184

7950g 8050g

99. Felix has 8kg of sugar, correct to the nearest 100g.
Each cake he makes use 300g of sugar, correct to the nearest 10g.

295g 305g

What is the minimum amount of sugar that Felix could have left after making 6 cakes?

$7950 - (6 \times 305) = 6120$

6120 .....g

100. Sophie estimated that the distance between Glengormley and Newcastle is about 40 miles and that her average driving speed would be 60 mph.

35 45

She estimated the distance to the nearest 10 miles and the speed to the nearest 10 mph. 55mph 65mph

Calculate the upper bound of the time the journey should take.
Give your answer to the nearest minute.

$s = \frac{d}{t}$ $t = \frac{d}{s}$

$t = \frac{45}{55}$

$= 0.818181\ldots$ hours

49.09 mins

49 .....minutes

Surds - Videos 305, 306, 307, 308

101. Work out $\sqrt{10} \times \sqrt{3}$

$\sqrt{30}$

102. Work out $\sqrt{5} \times \sqrt{20}$

$\sqrt{100} = 10$

10

103. Work out $2\sqrt{3} \times 3\sqrt{5}$

$6\sqrt{15}$

104. Work out $(\sqrt{5})^4$

$\underbrace{\sqrt{5} \times \sqrt{5}}_{5} \times \underbrace{\sqrt{5} \times \sqrt{5}}_{5}$

25

105. Work out $\frac{\sqrt{12}}{\sqrt{3}}$

$\sqrt{4} = 2$

2

106. Simplify $\sqrt{63}$

$\sqrt{9} \times \sqrt{7}$

$3\sqrt{7}$

107. Work out $\sqrt{90} + \sqrt{1000}$

$\sqrt{9} \times \sqrt{10}$ $\quad$ $\sqrt{100} \times \sqrt{10}$

$3\sqrt{10} + 10\sqrt{10} = 13\sqrt{10}$

$13\sqrt{10}$

108. Expand and simplify $(2+\sqrt{3})(4-\sqrt{3})$

$8 - 2\sqrt{3} + 4\sqrt{3} - 3$

$5 + 2\sqrt{3}$

$5 + 2\sqrt{3}$

Rationalising Denominators - Video 307

109. Rationalise the denominator $\dfrac{2}{\sqrt{3}}$ $\times\sqrt{3}$ / $\times\sqrt{3}$

$\dfrac{2\sqrt{3}}{3}$

110. Rationalise the denominator $\dfrac{4+\sqrt{5}}{3-\sqrt{2}}$ $\times(3+\sqrt{2})$ / $\times(3+\sqrt{2})$

$\dfrac{12 + 4\sqrt{2} + 3\sqrt{5} + \sqrt{10}}{9 + 3\sqrt{2} - 3\sqrt{2} - 2} = \dfrac{12 + 4\sqrt{2} + 3\sqrt{5} + \sqrt{10}}{7}$

Product Rule for Counting - Video 383

At Corbett's Cafe there are

7 starters
16 main dishes
11 desserts

A meal voucher allows a customer to pick one starter, one main dish and one dessert for £10

111. How many different ways are there to choose a meal?

$7 \times 16 \times 11 = 1232$

1232

Three of the starters and four of the main dishes contain fish.
A different customer uses their meal voucher but they do not like fish.

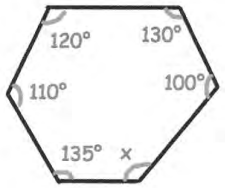
112. How many different meal combinations can they choose?

$4 \times 12 \times 11$

528

Angles (polygons) - Video 32

113. Find the size of angle x.



120
130
100
110
+ 135
595

720 - 595

125 °

114. Work out the sum of the interior angles for 18 sided polygon.

18 - 2 = 16

16 × 180

2880 °

115. The sum of the interior angles in a polygon is 3960°
Work out the number of sides the polygon has.

3960 ÷ 180 = 22

22 + 2 = 24

24 sides

116. Calculate the size of each interior angle in a regular polygon with 40 sides.

360 ÷ 40 = 9

180 - 9 = 171

171 °

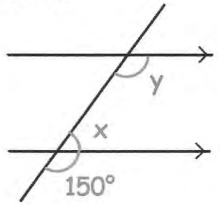
117. Calculate the size of each exterior angle in a regular polygon with 45 sides.

360 ÷ 45

8 °

Angles in Parallel Lines - Video 25

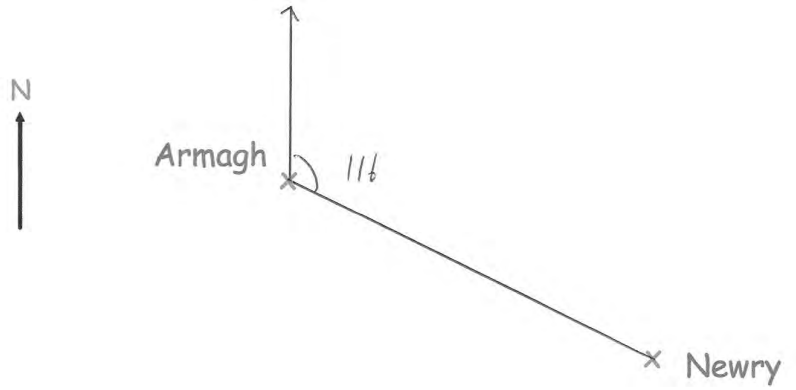
118. Find the sizes of angles x and y.



x = 30 ° y = 150 °

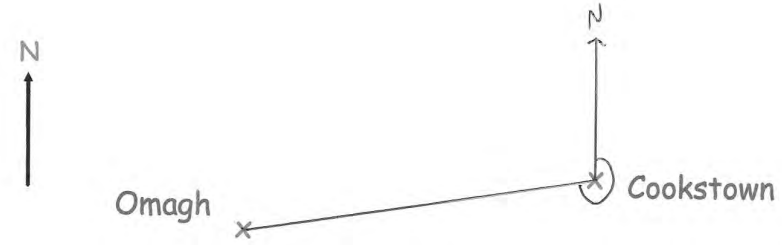
Bearings - Video 26

119. Write down the three figure bearing of Newry from Armagh



116 °

Answer may differ slightly

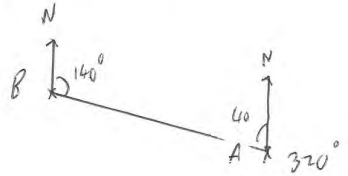


120. Write down the three figure bearing of Omagh from Cookstown

Answers may differ slightly 262 °

Back Bearings - Video 27a

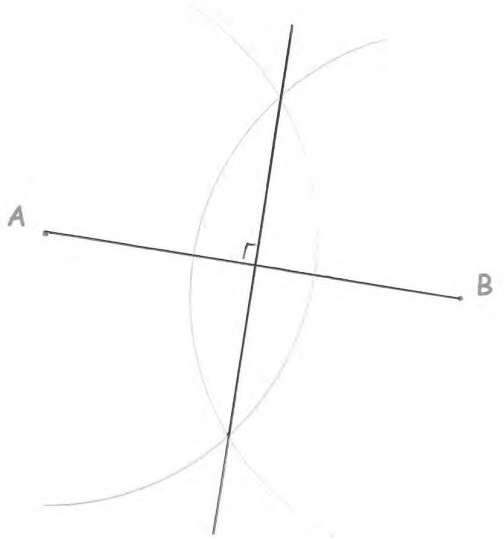
121. The bearing of town A from town B is 140°
What is the bearing of town B from town A?



320 °

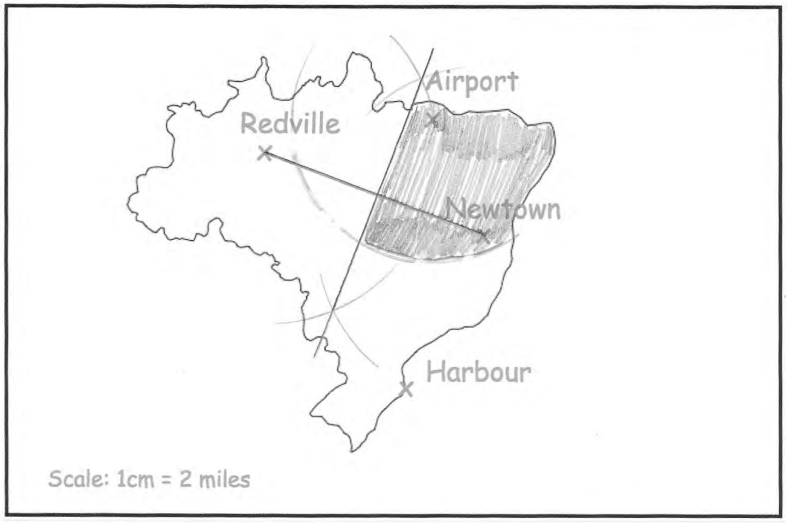
Constructions - Videos 78, 72, 79

122. Use ruler and compasses to construct the perpendicular bisector of AB.
You must show clearly all your construction arcs.



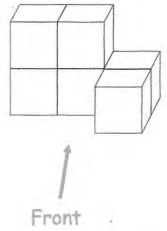
Loci - Videos 75 to 77

123. A farm is closer to Newtown than to Redville.
It is less 6 miles away from the Airport.
3cm
Shade the region on the map where the farm could be.

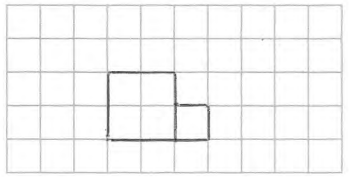


Views and Elevations - Video 354

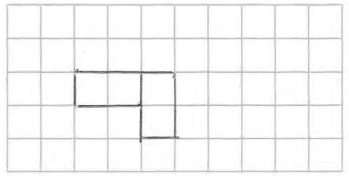
124. Shown below is a solid shape made from 6 centimetre cubes.



On the centimetre square grid, draw the front elevation.



On the centimetre square grid, draw the plan view.



Speed, Distance, Time - Video 299

125. A car travels 300 miles in 5 hours 40 minutes.
Work out the average speed of the car.
Give your answer to 1 decimal place.

$S = \frac{d}{t}$

$= \frac{300}{5.6}$

$= 52.94117..$

52.9 mph

126. Richard runs at a speed of 8m/s for 25 seconds.
How far does Richard run?

$d = s \times t$

$= 8 \times 25$

$= 200$

200 m

127. Paige drives 90 miles at a speed of 60mph.
How long does the journey take?

$t = \frac{d}{s}$

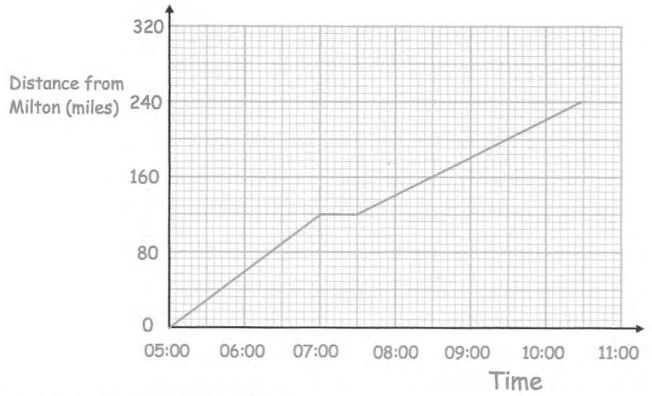
$= \frac{90}{60}$

$= 1.5$ hours

1hr 30min

Distance-Time Graphs - Video 171

A train travels from Milton to Redville, stops for 30 minutes and then travels to Leek.



128. How far is Redville from Milton?

120 miles

129. How long did it take the train to travel from Redville to Leek?

3 hours

130. Work out the average speed of the train for the journey from Milton to Redville

$\frac{120}{2} = 60$ mph

60 mph

Density - Video 384

131. A piece of aluminium has a mass of 575.4g and a volume of 210cm³

Calculate the density of the aluminium

$d = \frac{m}{v}$

$= \frac{575.4}{210}$

2.74 ..... g/cm³

132. A statue has a volume of 120cm³ and is made from zinc with a density of 7.14g/cm³

Calculate the mass of the statue

$m = d \times v$

$= 7.14 \times 120$

$= 856.8$

856.8 ..... g

Pressure - Video 385

133. A cube with side length 8cm is placed on a table. $8 \times 8 = 64 cm^2$
The cube exerts a force of 400N on the table.

Work out the pressure on the table in Newtons/cm²

$P = \frac{F}{A}$

$= \frac{400}{64}$

$= 6.25$

6.25 ..... N/cm²

Population Density - Video 384a

134. A town has a population density of 184 per km²
The town covers an area of 72km²

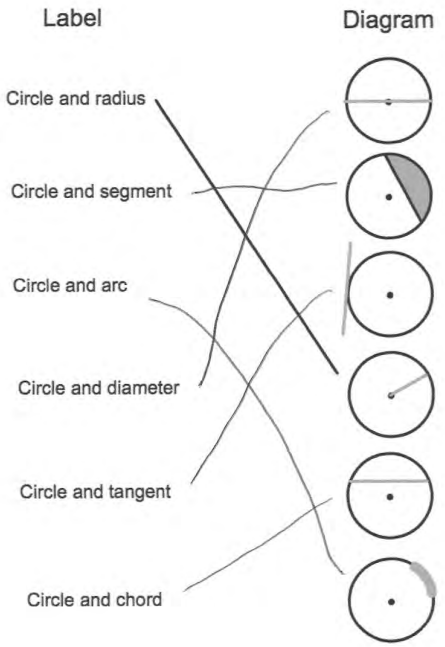
Work out the population of the town.

$184 \times 72 =$

13248 ..... ~~km²~~

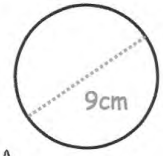
Parts of a Circle - Video 61

135.



Circumference - Video 60

136. Calculate the circumference of this circle.
Give your answer to 1 decimal place.



$C = \pi \times d$

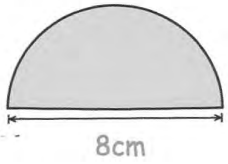
$\pi \times 9$

$= 28.2743...$

28.3 ..... cm

Perimeter of a Semi-Circle - Video 243

137. Calculate the perimeter of this semi-circle



$\pi \times 8 = 25.1327...$

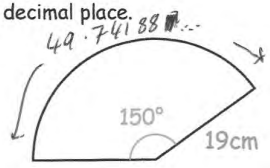
$25.1327... \div 2 = 12.566...$

$12.566... + 8 = 20.566...$

20.57 ..... cm

Arc Length - Video 58

138. Find the perimeter of this sector.
Give your answer to 1 decimal place.



$\frac{150}{360} \times \pi \times 38$

$= 49.74188...$

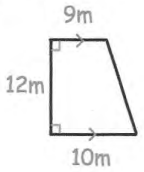
$49.74188...$

$19 + 19 + 49.74188...$

87.7 ..... cm

Area of a Trapezium - Video 48

139. Calculate the area of the trapezium



$A = \frac{1}{2}(9 + 10) \times 12$

$= \frac{1}{2}(19) \times 12$

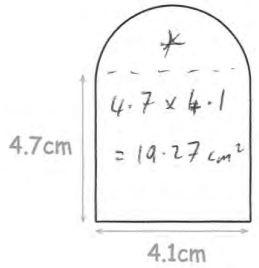
$= 9.5 \times 12$

$= 114$

114 ..... m^2

Area of Compound Shapes - Video 41

140. Calculate the area of this compound shape.



$\frac{1}{2} \times \pi \times 2.05^2$

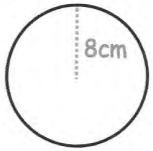
$= 6.60127...$

$19.27 + 6.60127... = 25.8712...$

25.87 + 2 ..... cm^2

Area of a Circle - Video 59

141. Calculate the area of this circle.
Give your answer to 1 decimal place.



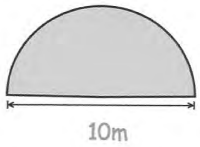
$A = \pi r^2$

$\pi \times 8^2 = 201.0619...$

201.1 ..... cm^2

Area of a Semi-Circle - Video 47

142. Calculate the area of this semi-circle



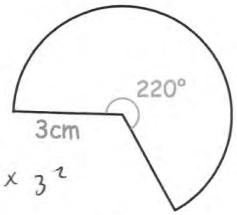
$\frac{1}{2} \times \pi \times 5^2$

$= 39.27 cm^2$ to 2dp

39.27 ..... m^2

Area of a Sector - Video 46

143. Find the area of this sector.
Give your answer to 1 decimal place.



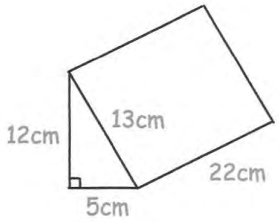
$\frac{220}{360} \times \pi \times 3^2$

$= 17.2787...$

17.3 ..... cm^2

Volume of a Prism - Video 356

144. Calculate the volume of the triangular prism.



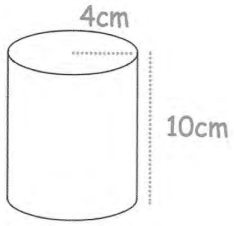
$\frac{1}{2}(5 \times 12) \times 22$

$= 660$

660 ..... cm^3

Volume of a Cylinder - Video 357

145. Calculate the volume of the cylinder.



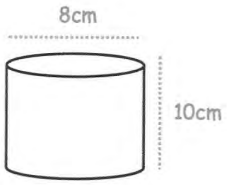
$V = \pi \times 4^2 \times 10$

$= 502.65...$

502.655 ..... cm^3

In terms of Pi - Video x

146. Calculate the volume of the cylinder.
Give your answer in terms of π



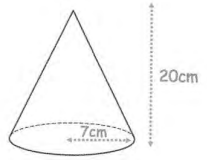
$V = \pi \times 4^2 \times 10$

$= \pi \times 16 \times 10$

160π ..... cm^3

Volume of a Cone - Video 359

147. Calculate the volume of the cone.
Give your answer to 1 decimal place.



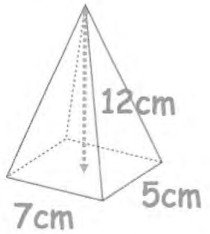
$V = \frac{1}{3} \times \pi \times 7^2 \times 20$

$= 1026.2536...$

1026.3 ..... cm^3

Volume of a Pyramid - Video 360

148. Work out the volume of the pyramid.



$V = \frac{1}{3} \times (7 \times 5) \times 12$

$= 140$

140 ..... cm^3

Volume of a Sphere - Video 361

149. Calculate the volume of the sphere.
Give your answer to 1 decimal place.

$V = \frac{4}{3} \times \pi \times 4^3$

$= 268.0825...$

268.1 ..... cm^3

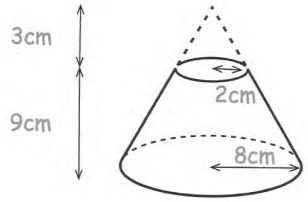
Volume of a Frustum - Video 360a

150. Find the volume of the frustum below.

Whole cone:

$V = \frac{1}{3} \times \pi \times 8^2 \times 12$

$= 256\pi \ cm^3$



Removed cone:

$V = \frac{1}{3} \times \pi \times 2^2 \times 3$

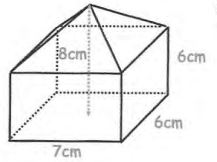
$= 4\pi \ cm^3$

$256\pi - 4\pi = 252\pi$

791.68 ..... cm^3
or
252π

Composite Solids - Video 360

151. A solid glass paperweight is shown below.
The density of the glass used is $2.5 g/cm^3$
Work out the mass of the paperweight.



Cuboid: $7 \times 6 \times 6 = 252 cm^3$

Pyramid: $\frac{1}{3} \times (7 \times 6) \times 2$

$= 28 cm^3$

Volume: $280 cm^3$

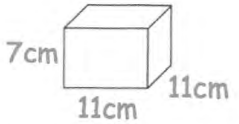
$m = 2.5 \times 280$

$= 700$

700 ..... g

Surface Area - Video 310

152. Work out the surface area of this cuboid.



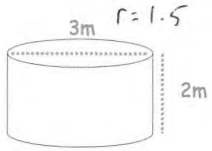
$(2 \times (7 \times 11)) + (2 \times (7 \times 11)) + (2 \times (11 \times 11))$

$154 + 154 + 242$

550 ..... cm^2

Surface Area of a Cylinder - Video 315

153. Calculate the surface area of the cylinder.
Give your answer to 2 decimal places.



$\pi \times 3 \times 2 = 6\pi \ m^2$

$\pi \times 1.5^2 = 2\frac{1}{4}\pi \ m^2$

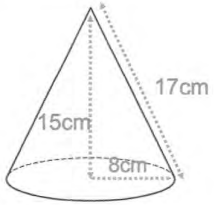
$6\pi + 2\frac{1}{4}\pi + 2\frac{1}{4}\pi = 10.5\pi$

$= 32.98...$

32.99 ..... cm^2

Surface Area of a Cone - Video 314

154. Calculate the surface area of the cone.
Give your answer to 1 decimal place.



$\pi \times 8 \times 17 = 427.2566...$

$\pi \times 8^2 = 201.0619...$

628.3 ..... cm^2

Surface Area of a Sphere - Video 313

155. Calculate the surface area of the sphere.
Give your answer to 1 decimal place.

$4 \times \pi \times 3^2$

113.1 ..... cm^2

Converting Units for Area/Volume - Videos 350, 351

156. Write $7m^2$ in cm^2

$7 \times 100 \times 100$

70000 ..... cm^2

157. Write $19000000cm^3$ in m^3

19 ..... m^3

Imperial Units - Videos 349a, 349b, 349c

158. Given that 5 miles = 8 kilometres, convert 25 miles in kilometres

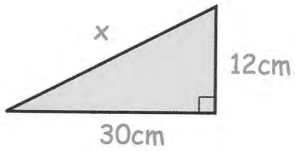
$25 \div 5 = 5$

$5 \times 8 = 40$

40 ..... km

Pythagoras - Video 257

159. Find x.
Give your answer to 2 decimal places.



$12^2 + 30^2 = x^2$

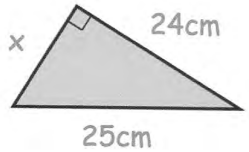
$144 + 900 = x^2$

$1044 = x^2$

$x = \sqrt{1044}$

32.31 ..... cm

160. Find x.
Give your answer to 2 decimal places.



$x^2 + 24^2 = 25^2$

$x^2 + 576 = 625$

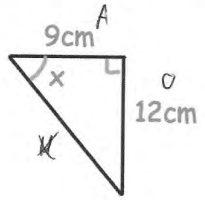
$x^2 = 49$

$x = 7$

7 ..... cm

Trigonometry - Videos 329, 330, 331

161. Find x

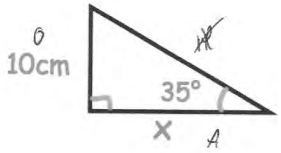


$\tan x = \frac{12}{9}$

$x = \tan^{-1}\left(\frac{12}{9}\right)$

53.13 ..... °

162. Find x



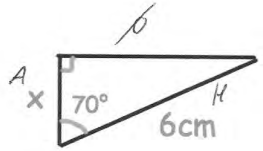
$\tan 35 = \frac{10}{x}$

$x \tan 35 = 10$

$x = \frac{10}{\tan 35}$

14.28 ..... cm

163. Find x



$\cos 70 = \frac{x}{6}$

$6 \cos 70 = x$

$x = 2.052...$

2.052 ..... cm

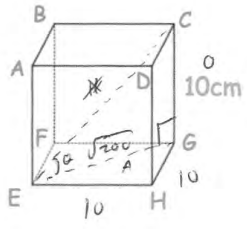
Exact Trig Values - Videos 329, 330, 331

164. Write down the value of cos90°

0

3D Trigonometry - Video 332

165. Shown below is cube ABCDEFGH.
Work out the size of angle CEG



$EG^2 = 10^2 + 10^2$

$EG^2 = 200$

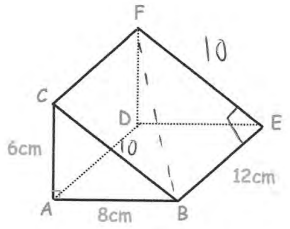
$EG = \sqrt{200}$

$\tan\theta = \frac{10}{\sqrt{200}}$

$\theta = 35.26$

35.26 °

3D Pythagoras - Video 259



166. Work out the length of BC

$BC^2 = 6^2 + 8^2$

$BC^2 = 36 + 64$

$BC^2 = 100$

$BC = 10$

10 cm

167. Work out the length of BF

$BF^2 = 10^2 + 12^2$

$BF^2 = 100 + 144$

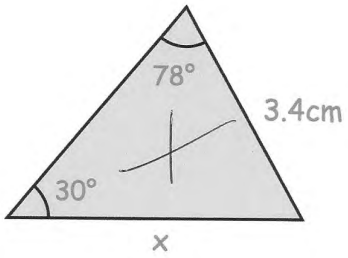
$BF^2 = 244$

$BF = 15.62$

15.62 cm

Sine Rule - Videos 333, 334

168. Find the size of x.

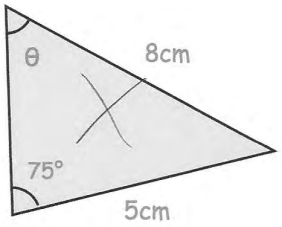


$\frac{x}{\sin 78} = \frac{3.4}{\sin 30}$

$x = 6.8 \times \sin 78$

6.651 ..... cm

169. Find the size of θ.



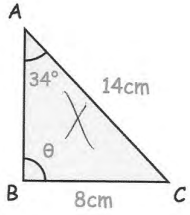
$\frac{\sin\theta}{5} = \frac{\sin 75}{8}$

$\sin\theta = 0.6037\ldots$

37.136 ..... °

Ambiguous Case - Videos 333, 334

170. The triangle below has two possible value of θ
Find the size of these possible angles.
Give your answers to 1 decimal place.



$\frac{\sin\theta}{14} = \frac{\sin 34}{8}$

$\sin\theta = 0.9785\ldots$

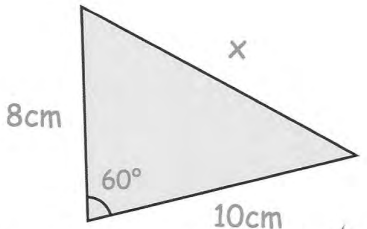
$\theta = 78.12\ldots$

$180 - 78.12\ldots = 101.878\ldots$

78.1 ..... ° and 101.9 ..... °

Cosine Rule - Videos 335, 336

171. Find the size of x.



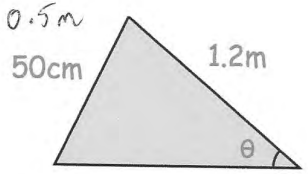
$x^2 = 8^2 + 10^2 - 2 \times 8 \times 10 \times \cos 60$

$x^2 = 84$

$x = \sqrt{84}$

9.165 ..... cm

172. Find the size of θ.



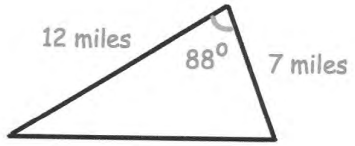
$\cos\theta = \frac{1^2 + 1.2^2 - 0.5^2}{2 \times 1 \times 1.2}$ (1m)

$\cos\theta = \frac{73}{80}$

24.15 .....°

Area of any Triangle - Video 337

173. Calculate the area of the triangle below.



$\frac{1}{2} \times 12 \times 7 \times \sin 88$

$= 41.97$

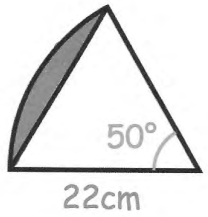
41.97 .....square miles

Area of a Segment - Video 337

174. Calculate the area of the segment below.

$\frac{50}{360} \times \pi \times 22^2$

$= 211.1844395\ldots\ cm^2$



$\frac{1}{2} \times 22 \times 22 \times \sin 50$

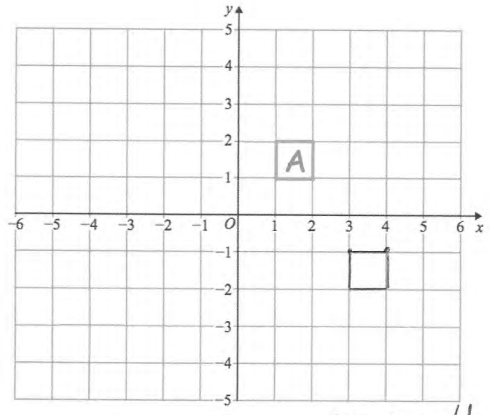
$= 185.38\ldots$

$211.18\ldots - 185.38\ldots =$

25.8 .....cm^2

Translations - Video 325

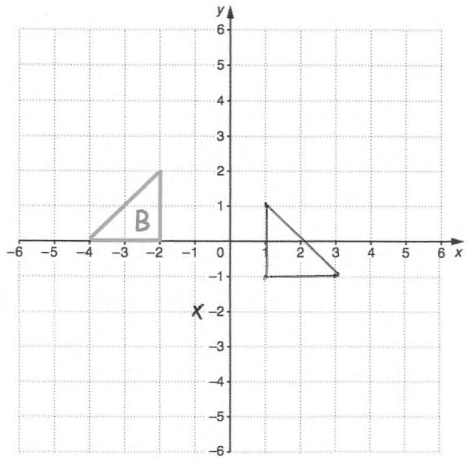
175.



Translate A by $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ right down

Rotations - Video 275

176.

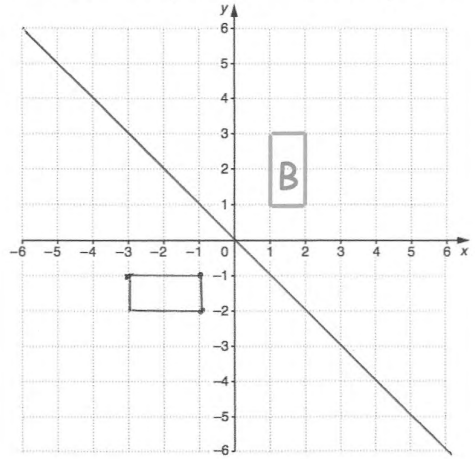


rotate 90° clockwise about (-1, -2)

Reflections - Video 272

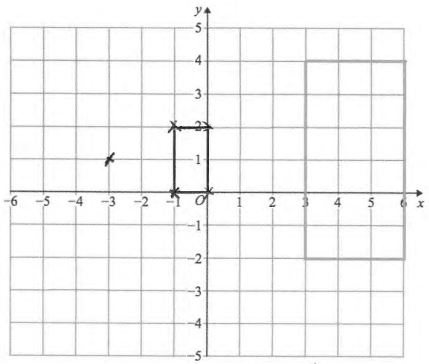
177.

Reflect shape B in the line y = -x



Enlargements - Videos 104, 104a

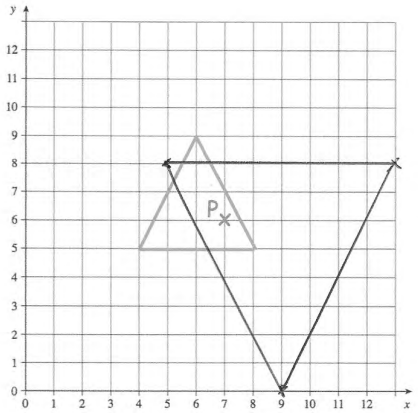
178.



Enlarge by scale factor $\frac{1}{3}$ using (-3, 1) as the centre of enlargement

Negative Scale Factors - Video 108

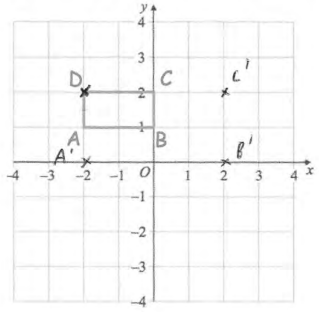
179.



Enlarge by scale factor -2

Invariant Points - Video 392

180. ABCD is enlarged by scale factor 2, with centre of enlargement (–2, 2)



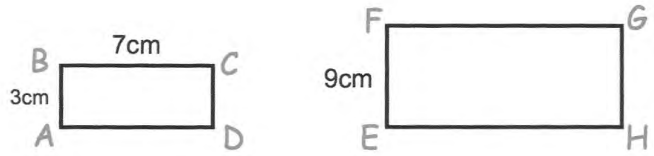
Which vertex is invariant?

D

Similar Shapes - Video 292

181. Shown below are two mathematically similar rectangles

Not drawn accurately

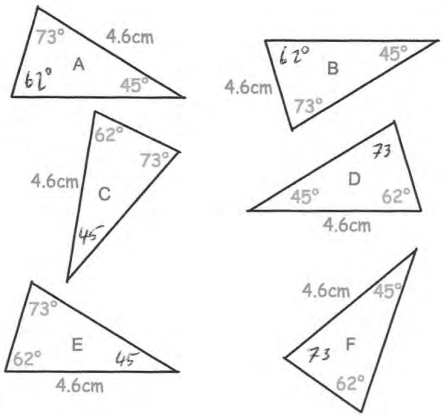


. Find the length of FG

21 cm

Congruent Triangles - Video 67

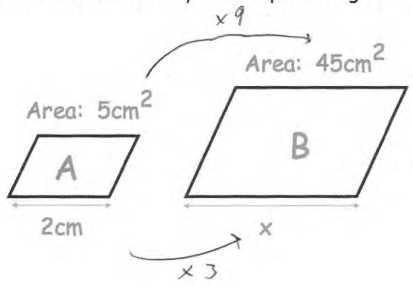
182. Shown are six triangles.
Which triangles are congruent?



ARE CONE

Similar Shapes - Video 293b

183. Shown below are two mathematically similar parallelograms.



Find x

6 cm

184. Find the surface area of the larger sphere.

Surface area = 324π cm^2

Volume = 972π cm^3

Surface area = ☐ cm^2

Volume = 2304π cm^3

$\times \frac{64}{27}$

$\sqrt[3]{\frac{64}{27}} = \frac{4}{3}$

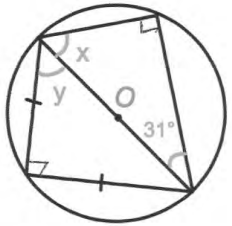
$\left(\frac{4}{3}\right)^2 = \frac{16}{9}$

$324\pi \times \frac{16}{9}$

576π cm^2

Circle Theorems - Videos 64, 65

185. Find x and y



$180 - 90 - 31 = 59°$

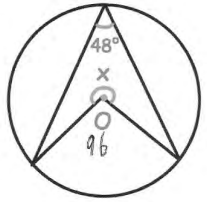
$180 - 90 = 90$

$90 \div 2 = 45$

x = 59 °

y = 45 °

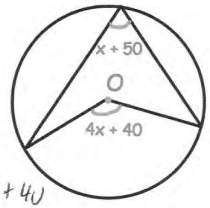
186. Find x



$360 - 96 = 264$

x = 264 °

187. Find x



$2(x + 50) = 4x + 40$

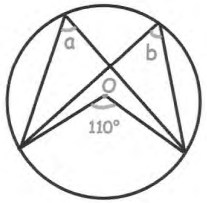
$2x + 100 = 4x + 40$

$100 = 2x + 40$

$60 = 2x$

x = 30 °

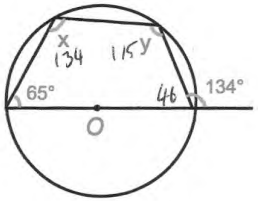
188. Find a and b



a = 55 °

b = 55 °

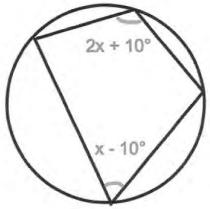
189. Find x and y



x = ... °

y = 115 °

190. Find x



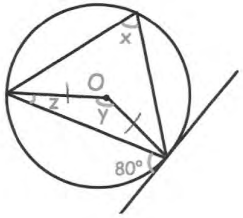
$(2x+10)+(x-10)=180$

$3x = 180$

$x = 60$

x = 60 °

191. Find x, y and x

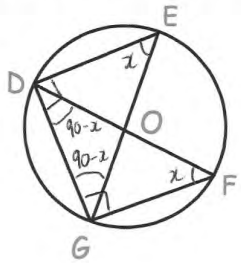


x = 80 °

y = 160 °

z = 10 °

Geometric Proof - Videos 64, 65



192. O is the centre of the circle.
DOF and EOG are diameters of the circle shown.
Prove triangles DEG and DFG are congruent.

$\angle EDG = \angle DGF = 90°$ (angles in a semi-circle) $= 90°$

$\angle DEG = \angle DFG = x$ (angles in same segment are equal)

$\angle FDG = \angle EGD = 90-x$ (angles in a triangle add to 180°)

$DF = EG$ (both diameters)

DEG & DFG are congruent as ASA.

Column Vectors - Video 353a

193. $\mathbf{a} = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$

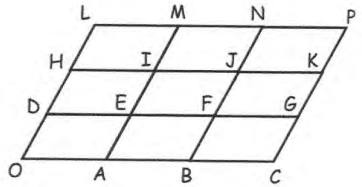
Work out $4\mathbf{a} + 2\mathbf{b}$

$4\underline{a} = \begin{pmatrix} 8 \\ 0 \end{pmatrix}$ $2\underline{b} = \begin{pmatrix} 2 \\ 10 \end{pmatrix}$

$\begin{pmatrix} 10 \\ 10 \end{pmatrix}$

Vectors - Video 353

Shown below are 9 congruent parallelograms.



$\overrightarrow{OA} = \underline{a}$ $\overrightarrow{OD} = \underline{b}$

194. Write $\overrightarrow{OI}$ in terms of **a** and **b**

$\underline{a} + 2\underline{b}$

195. Show $\overrightarrow{HM}$ and $\overrightarrow{AK}$ are parallel

$\overrightarrow{HM} = \underline{a} + \underline{b}$

$\overrightarrow{AK} = 2\underline{a} + 2\underline{b}$

$\overrightarrow{AK} = 2\overrightarrow{HM}$

as multiples, they are parallel.

The line LIC is drawn.

196. Show LIC is a straight line.

$\overrightarrow{LI} = \underline{a} - \underline{b}$

$\overrightarrow{IC} = 2\underline{a} - 2\underline{b}$

$2\overrightarrow{LI} = \overrightarrow{IC}$ since $\overrightarrow{LI}$ & $\overrightarrow{IC}$ are parallel and both pass through I, LIC is a straight line.

Collecting Like Terms - Video 9

197. Simplify $8x + y - 5x - 5y$

$3x - 4y$

198. Expand and simplify $2(7x - 8y) - 3(x - 4y)$

$14x - 16y - 3x + 12y$

$11x - 4y$

Substitution - Video 20

199. Given that $w = 3$ and $y = -9$

find the value of $7w - 2y$

$21 - (-18)$

39

200. x is an odd number
y is an even number

State if the following are odd or even

$x + y$

odd

xy

even

Laws of Indices - Video 174

201. Simplify $w^{-4} \times w^{7}$

w^3

202. Simplify $\frac{w^5}{w^{-8}}$

w^{13}

203. Simplify $(w^4)^{-5}$

w^{-20}

Expanding Brackets - Video 13

204. Multiply out and simplify $2(x + 3) + 4(x - 1)$

$2x + 6 + 4x - 4$

$6x + 2$

$6x + 2$

205. Expand $3y^2(4y - 3)$

$12y^3 - 9y^2$

$12y^3 - 9y^2$

Expanding 2 Brackets - Video 14

206. Expand and simplify $(x - 12)(x - 3)$

$x^2 - 15x + 36$

207. Expand and simplify $(5x + 4)(x - 2)$

$5x^2 - 10x + 4x - 8$

$5x^2 - 6x - 8$

Expanding 3 Brackets - Video 15

208. Expand and simplify $(x - 1)(x + 3)(x + 5)$

$(x^2 + 2x - 3)(x + 5)$

$x^3 + 2x^2 - 3x + 5x^2 + 10x - 15$

$x^3 + 7x^2 + 7x - 15$

Factorising - Video 117

209. Factorise $4x^3 + 5x$

$x(4x^2 + 5)$

Factorising Quadratics - Video 118

210. Factorise $x^2 - 6x - 55$

$(x + 5)(x - 11)$

211. Factorise $x^2 - 12x + 32$

$(x - 4)(x - 8)$

Factorising Harder Quadratics - Video 119

212. Factorise $3x^2 + 4x + 1$

$(3x + 1)(x + 1)$

213. Factorise $2x^2 + 7x - 15$

$(2x - 3)(x + 5)$

214. Factorise $6x^2 - 11x - 10$

$(3x + 2)(2x - 5)$

Difference between 2 Squares - Video 120

215. Factorise $x^2 - 4$

$(x+2)(x-2)$

216. Factorise $81 - x^2$

$(9 - x)(9 + x)$

Letters Both Sides - Video 113

217. Solve $7x + 2 = 4x + 29$

$3x + 2 = 29$

$3x = 27$

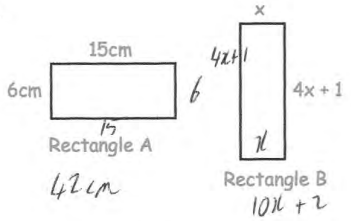
$x = 9$

x = 9

Forming Equations - Videos 114, 115

218. Both rectangles have the same perimeter.

Find the value of x.



$10x + 2 = 42$

$10x = 40$

$x = 4$

Solving Quadratics - Video 266

219. Solve $x^2 + 7x + 10 = 0$

$(x+2)(x+5) = 0$

$x = -2$ or $x = -5$

$x = -2$ or $x = -5$

220. Solve $x^2 - 2x - 8 = 0$

$(x+2)(x-4) = 0$

$x = -2$ or $x = 4$

$x = -2$ or $x = 4$

Quadratic Equations - Video 266

221. Solve $2x^2 + 7x - 4 = 0$

$(2x-1)(x+4) = 0$

$x = \frac{1}{2}$ or $x = -4$

$x = -4$ or $x = \frac{1}{2}$

222. Solve $4x^2 - 4x - 35 = 0$

$(2x-7)(2x+5) = 0$

$x = \frac{7}{2}$ or $x = -\frac{5}{2}$

$x = \frac{7}{2}$ or $x = -\frac{5}{2}$

Quadratic Formula - Video 267

223. Solve $x^2 - 6x - 20 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Give your answers to 1 decimal place.

$a = 1$

$b = -6$

$c = -20$

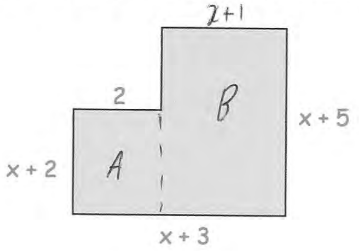
$x = \frac{6 \pm \sqrt{36 - (4 \times 1 \times -20)}}{2}$

$x = \frac{6 \pm \sqrt{116}}{2}$

$x = \frac{6 + \sqrt{116}}{2}$ or $x = \frac{6 - \sqrt{116}}{2}$

$x = 8.4$ or $x = -2.4$

Forming Quadratic Equations - Video 266



224. Writing an algebraic expression for the area of the shape

$A: 2(x+2) = 2x+4$

$B: (x+1)(x+5) = x^2 + 6x + 5$

$x^2 + 8x + 9$

$x^2 + 8x + 9$

225. Given that the area of the shape is 74cm², form an equation and solve it to find x.

$x^2 + 8x + 9 = 74$

$x^2 + 8x - 65 = 0$

$(x+13)(x-5) = 0$

$x = -13$ or $x = 5$

x

$x = 5$

Completing the Square - Video x

226. Write $x^2 + 6x - 20$ in the form $(x + a)^2 + b$ where a and b are integers.

$(x+3)^2 - 9 - 20$

$(x+3)^2 - 29$

227. Use your answer to 226. to solve $x^2 + 6x - 20 = 0$

$(x+3)^2 - 29 = 0$

$(x+3)^2 = 29$

$x+3 = \pm\sqrt{29}$

$x = -3 \pm \sqrt{29}$

$x = -3 + \sqrt{29}$ or $x = -3 - \sqrt{29}$

Changing the Subject - Video 7

228. Make x the subject of $m = 2x - y$

$m + y = 2x$

$\frac{m+y}{2} = x$

x = $\frac{m+y}{2}$

229. Make w the subject of the formula $4(g + w) = 9w - 3$

$4g + 4w = 9w - 3$

$4g = 5w - 3$

$4g + 3 = 5w$

$w = \frac{4g+3}{5}$

w = $\frac{4g+3}{5}$

230. Make v the subject of $s = \frac{1}{2}(u + v)t$

$2s = (u+v)t$

$2s = ut + vt$

$2s - ut = vt$

$v = \frac{2s-ut}{t}$

v = $\frac{2s-ut}{t}$

Algebraic Fractions - Videos 22 to 24

231. Express $\frac{w}{3} - \frac{w+2}{4}$ as a single fraction

$\frac{4w}{12} - \frac{3w+6}{12}$

$\frac{w-6}{12}$

$\frac{w-6}{12}$

232. Simplify fully $\frac{c-2}{4} \times \frac{12}{2c-4}$

$2(c-2)$

$\frac{12}{8} = \frac{3}{2}$

$\frac{3}{2}$

233. Simplify $\frac{x^2+8x}{x^2+10x+16}$

$\frac{x(x+8)}{(x+2)(x+8)}$

$\frac{x}{x+2}$

234. Simplify fully $\frac{v+3}{15} \div \frac{v^2+3v}{25}$

$\frac{v+3}{15} \div \frac{v(v+3)}{25}$

$\frac{v+3}{15} \times \frac{25}{v(v+3)}$

$\frac{25}{15v} = \frac{5}{3v}$

Answer: $\frac{5}{3v}$

Equations - Video 111

235. Solve $\frac{3x+5}{4} - \frac{x-7}{5} = 1$

$\frac{15x+25}{20} - \frac{4x-28}{20} = 1$

$\frac{11x+53}{20} = 1$

$11x + 53 = 20$

$11x = -33$

$x = -3$

Answer: $x = -3$

236. Solve $\frac{2x-3}{4} + \frac{3x+1}{5} = \frac{11}{5}$

$\frac{10x-15}{20} + \frac{12x+4}{20} = \frac{11}{5}$

$\frac{22x-11}{20} = \frac{11}{5}$

$22x - 11 = \frac{220}{5}$

$22x - 11 = 44$

$22x = 55$

$x = \frac{5}{2}$

Answer: $x = \frac{5}{2}$

Harder Equations - Videos 111, 111a

237. Solve $\frac{3}{x-1} + \frac{4}{x+5} = \frac{1}{3}$

$\frac{3(x+5) + 4(x-1)}{(x-1)(x+5)} = \frac{1}{3}$

$\frac{7x+11}{(x-1)(x+5)} = \frac{1}{3}$

$21x + 33 = (x-1)(x+5)$

$21x + 33 = x^2 + 4x - 5$

$0 = x^2 - 17x - 38$

$0 = (x+2)(x-19)$

Answer: $x = -2$ or $x = 19$

238. Solve $\frac{2}{2x-1} + \frac{1}{x-2} = 1$

$\frac{2(x-2) + 2x-1}{(2x-1)(x-2)} = 1$

$\frac{2x-4+2x-1}{2x^2-5x+2} = 1$

$4x - 5 = 2x^2 - 5x + 2$

$0 = 2x^2 - 9x + 7$

$0 = (2x-7)(x-1)$

Answer: $x = 1$ or $x = \frac{7}{2}$

Identities - Video 367

239. Work out the values of a and b in the identity

$4(6x+5) + 4(2x+b) \equiv ax - 8$

$24x + 20 + 8x + 4b$

$32x + 20 + 4b = ax - 8$

$4b = -28$

$b = -7$

a = 32

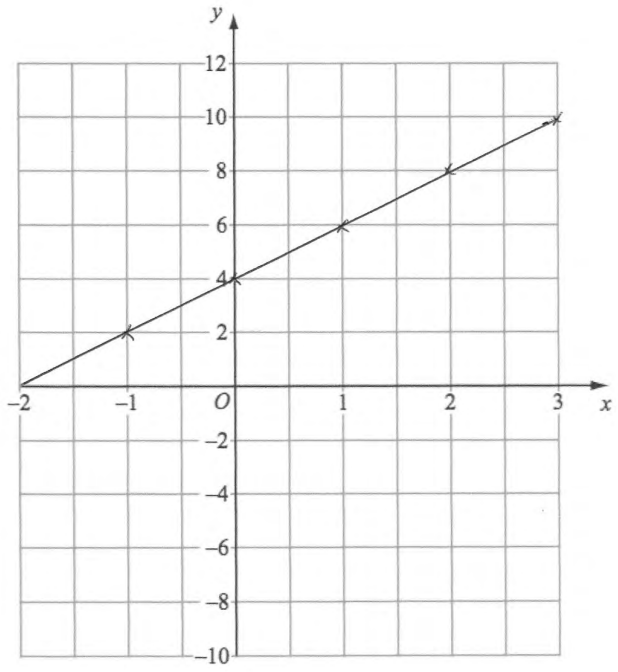
b = −7

Drawing Linear Graphs - Video 186

240. (a) Complete the table of values for y = 2x + 4.

x	-1	0	1	2	3
y	2	4	6	8	10

(b) On the grid, draw the graph of y = 2x + 4 for values of x from –1 to 3.



Midpoint of a Line - Video 198

241. A(3, –2) and B(7, 10)

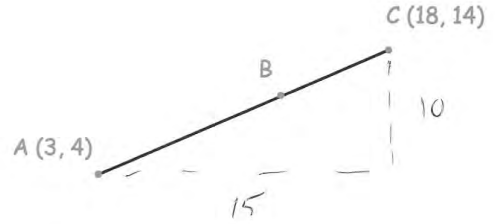
Find the coordinates of the midpoint of AB

$\frac{3+7}{2} = 5$

$\frac{-2+10}{2} = 4$

(5, 4)

Coordinates and Ratio - Video



242. ABC is a straight line.
AB : BC = 3 : 2 $3+2=5$

Work out the coordinates of the point B.

$15 \div 5 = 3$

$3 \times 3 = 9$

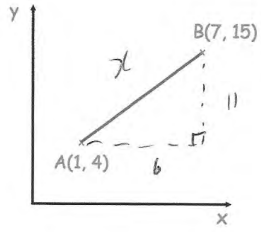
$10 \div 5 = 2$

$2 \times 3 = 6$

(12, 10)

Length of a Line - Video 263

243. Shown below are the points A(1, 4) and B(7, 15)



$6^2 + 11^2 = x^2$

$36 + 121 = x^2$

$157 = x^2$

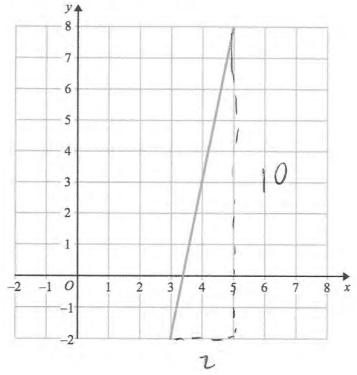
$x = \sqrt{157}$

Calculate the length of the line joining A and B.

12.53 to 2dp

Gradient - Video 189

244. Find the gradient of the line below



$m = \frac{10}{2}$

$= 5$

5

Equation of a Line - Videos 186 to 195

245. A straight line has equation $y = 5x - 2$

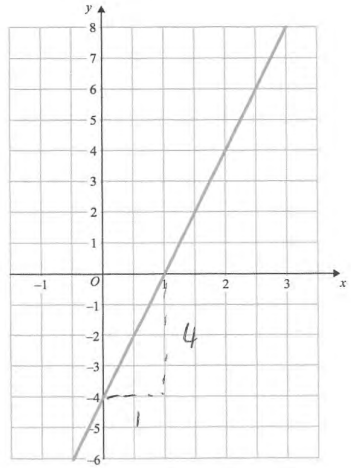
(a) What is the gradient of the line?

5

(b) Write down the coordinates of the y-intercept

(0, -2)

246. Find the equation of the line below



$y = 4x - 4$

247. A straight line has a gradient of –2 and passes through the point (1, 10).

Write down the equation of the line.

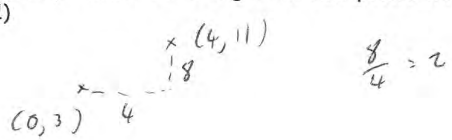
$y = -2x + c$

$10 = -2 + c$

$c = 12$

$y = -2x + 12$

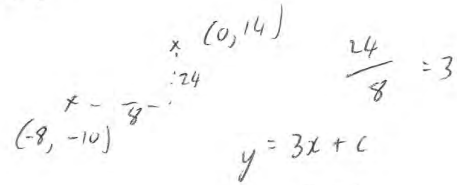
248. Find the equation of the straight line that passes through the points (0, 3) and (4, 11)



$\frac{8}{4} = 2$

$y = 2x + 3$

249. Find the equation of the straight line that passes through the points (–8, –10) and (0, 14)



$\frac{24}{8} = 3$

$y = 3x + c$

$-10 = -24 + c$

$c = 14$

$y = 3x + 14$

Parallel Lines - Video 196

250. Write down an equation of a line parallel to $y = 6x + 5$

$y = 6x - 1$

251. Write down the equation of the line parallel to $y = 3x + 1$ that passes through the point (0, 2)

$y = 3x + 2$

Perpendicular Lines - Video 197

252. Write down an equation of a line perpendicular to $y = 2x + 9$

$m = -\frac{1}{2}$

$y = -\frac{1}{2}x + 8$

253. Write down the equation of the line perpendicular to $y = 3x + 1$ that passes through the point (6, -5)

$y = -\frac{1}{3}x + c$

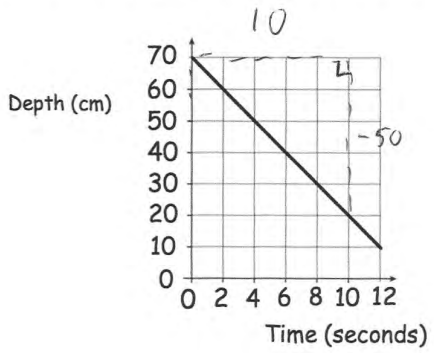
$-5 = -2 + c$

$c = -3$

$y = -\frac{1}{3}x - 3$

Real Life Graphs - Video 171a

254. The graph below shows the depth of water in a container.



Calculate the gradient of the line

-5

What does the gradient of the line represent?

How the depth of water in the container changes every second. A decrease of 5cm.

Simultaneous Equations - Video 295

255. Solve the simultaneous equations

$2x + 4y = 26$ — (1)
$3x - y = 4$ — (2)

$9 - y = 4$
$y = 5$

$6 + 20 = 26$ ✓

$4 \times (2)$

add
$12x - 4y = 16$
$2x + 4y = 26$
$14x = 42$
$x = 3$

x = 3 y = 5

256. Solve the simultaneous equations

$3x + 2y = 16$ — (1)
$2x - 3y = 2$ — (2)

$12 + 2y = 16$
$y = 2$

$8 - 6 = 2$ ✓

$3 \times (1)$ $9x + 6y = 48$
$2 \times (2)$ $4y - 6y = 4$
$13x = 52$
$x = 4$

x = 4 y = 2

257. Three bananas and two pears cost 95p.
Five bananas and three pears cost £1.51

Find the cost of ten bananas and ten pears.

$3x + 2y = 95$ — (1)
$5x + 3y = 151$ — (2)

$3 \times (1)$ $9x + 6y = 285$
$2 \times (2)$ $10x + 6y = 302$
sub $9x + 6y = 285$
$x = 17$

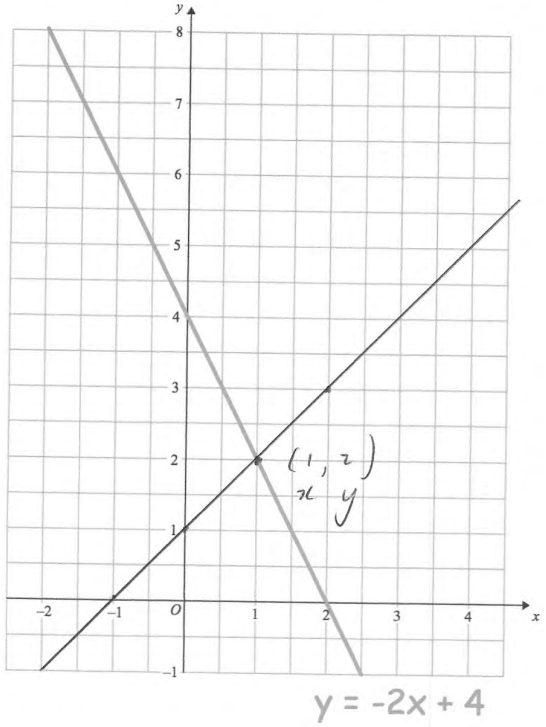
$10 \times 17 = £1.70$
$10 \times 22 = £2.20$

$51 + 2y = 95$
$2y = 44$
$y = 22$

£3.90

Graphical Solutions - Video 297

258. The straight line $y = -2x + 4$ has been drawn on the grid.



By drawing a suitable line, solve the simultaneous equations

$y = -2x + 4$

$y = x + 1$

x = 1 y = 2

Non-Linear Simultaneous Equations - Video 298

259. Solve the equations

$y = x + 3$
$y = x^2 + 5x - 2$

$x^2 + 5x - 2 = x + 3$

$x^2 + 4x - 5 = 0$

$(x + 5)(x - 1) = 0$

$x = -5$ or $x = 1$
$y = -2$ $y = 4$

Equation of a Circle - Video 12

The equation of a circle C, with centre O, is:

$x^2 + y^2 = 289$

260. Write down the coordinates of the centre of the circle, O.

(0, 0)

261. Find the radius of C.

$\sqrt{289}$

17

262. Show the point (8, 15) lies on C.

$8^2 + 15^2 = 289$

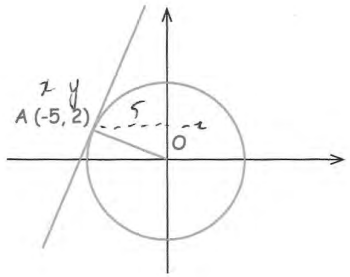
$64 + 225 = 289$

$289 = 289$ ✓

∴ (8,15) lies on the circle C

Equation of a Tangent - Video 372

The diagram shows the circle $x^2 + y^2 = 29$ with a tangent at the point (-5, 2)



263. Find the gradient of the line AO.

$-\frac{2}{5}$

264. Find the gradient of the tangent

$\frac{5}{2}$

265. Find the equation of the tangent

$y = \frac{5}{2}x + c$

$2 = \frac{5}{2}(-5) + c$

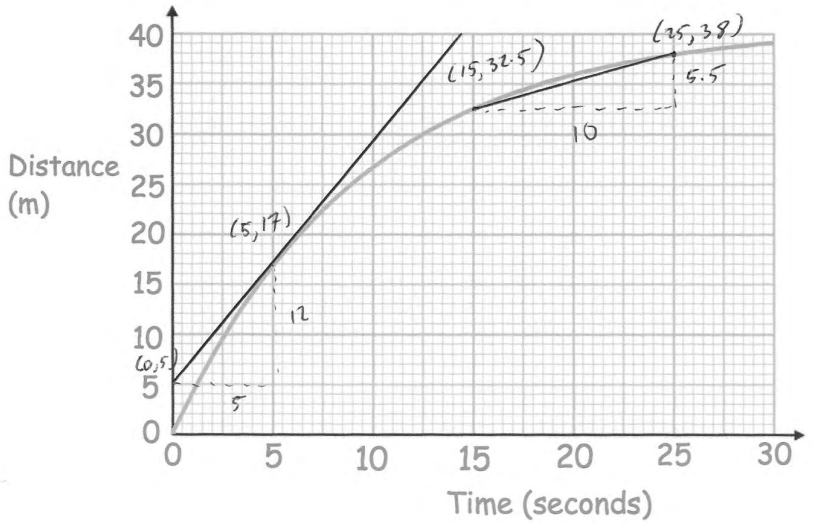
$2 = -\frac{25}{2} + c$

$c = \frac{25}{2} + 2$

$c = \frac{29}{2}$

$y = \frac{5}{2}x + \frac{29}{2}$

Rates of Change - Video 390a



266. Work out the speed of the car when t = 5

$17 - 5 = 12$

$5 - 0 = 5$

$\frac{12}{5} = 2.4$

2.4 m/s

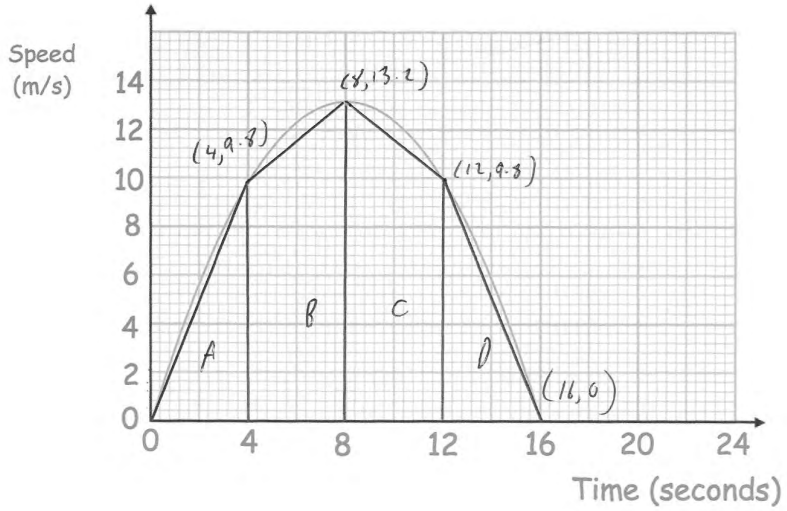
267. Work out the average speed of the car between t = 15 and t = 25

$\frac{5.5}{10}$

0.55 m/s

Area under a Graph - Video 389

Here is a speed-time graph for a toy rocket.



268. Work out an estimate for the distance the rocket travelled in the 16 seconds.
Use 4 strips of equal width.

$A: \frac{1}{2} \times 4 \times 9.8 = 19.6m$

$B: \frac{1}{2}(9.8 + 13.2) \times 4 = 46m$

$19.6 + 46 + 46 + 19.6 = 131.2$

131.2 m

269. Is your answer an underestimate or an overestimate of the actual distance the rocket travelled?
Give a reason for your answer

Underestimate as the chords are below the curve.

Composite Functions - Video

$f(x) = x^2 - 3$ $g(x) = 5x + 1$

270. Find fg(x)

$(5x+1)^2 - 3$

$25x^2 + 10x + 1 - 3$

$25x^2 + 10x - 2$

271. Find gf(x)

$5(x^2 - 3) + 1$

$5x^2 - 15 + 1$

$5x^2 - 14$

272. Find gg(x)

$5(5x+1) + 1$

$25x + 5 + 1$

$25x + 6$

273. Find ff(x)

$(x^2 - 3)^2 - 3$

$(x^2 - 3)(x^2 - 3) - 3$

$x^4 - 6x^2 + 9 - 3$

$x^4 - 6x^2 + 6$

Inverse Functions - Video

Given $f(x) = \frac{3x+4}{7}$

274. find $f^{-1}(x)$

$y = \frac{3x+4}{7}$ $\quad f^{-1}(x) = \frac{7x-4}{3}$

$7y = 3x + 4$

$7y - 4 = 3x$

$\frac{7y-4}{3} = x$

$f^{-1}(x) = \frac{7x-4}{3}$

275. find $f^{-1}(10)$

$f^{-1}(10) = \frac{7\times10-4}{3}$

$= \frac{66}{3}$

$= 22$

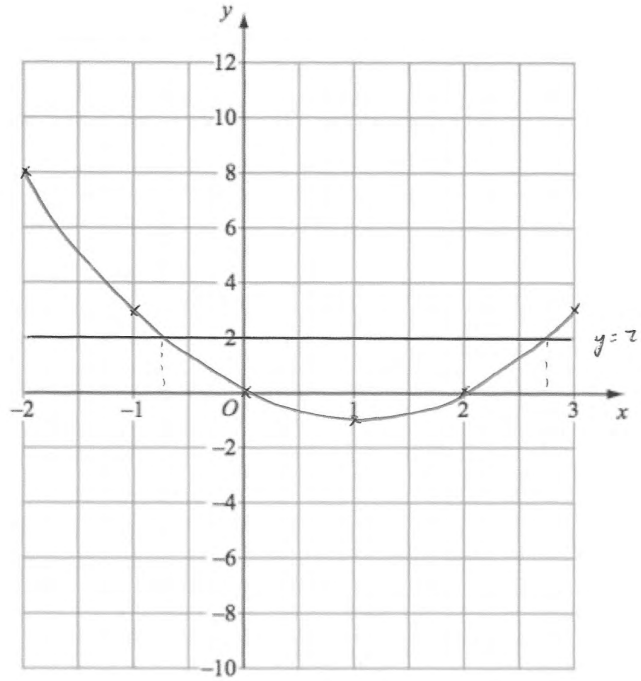
22

Quadratic Graphs - Video 264

276. Complete the table of values for $y = x^2 - 2x$

x	-2	-1	0	1	2	3
y	8	3	0	-1	0	3

277. Draw the graph of $y = x^2 - 2x$



Solving Quadratics Graphically - Video 267c

278. Use the graph from the previous question to estimate the values of x when y = 2

x = -0.75 and x = 2.75

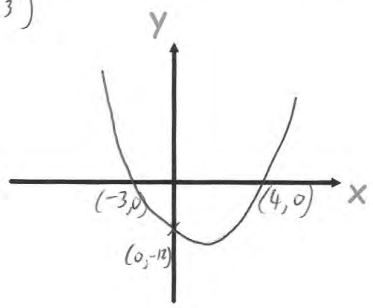
Sketching Quadratics - Video 265

279. Sketch the graph of $y = x^2 - x - 12$ below.
Clearly show where the graph meets the x-axis and y-axis.

$y = (x-4)(x+3)$

$0 = (x-4)(x+3)$

$x = 4$ or $x = -3$



Intersection Points - Video 267c, 267d

280. Write down the coordinates of where $y = x^2 - 3x$ and y = x intersect.

$x^2 - 3x = x$

$x^2 - 4x = 0$

$x(x-4) = 0$

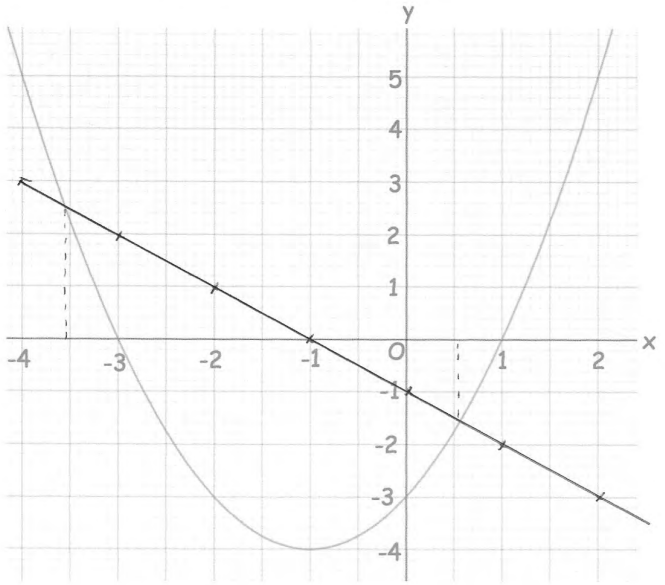
$x = 0$ or $x = 4$

$y = 0$ $y = 4$

(0,0) & (4,4)

Quadratics - Graphical Solutions - Video 267d

281. Shown below is the graph of $y = x^2 + 2x - 3$



By drawing an appropriate straight line, use your graph to find estimates for solutions of $x^2 + 3x - 2 = 0$

$y = x^2 + 2x - 3$

sub $0 = x^2 + 3x - 2$

$y = -x - 1$

$x = 0.55$ or $x = -3.55$

Quadratic Graphs - Turning Points and Symmetry - Video

282. Find the coordinates of the turning point of the graph $y = x^2 + 8x - 17$

$(x+4)^2 - 16 - 17$

$y = (x+4)^2 - 33$

$(-4, -33)$

283. Find the equation of the line of symmetry of $y = x^2 + 8x - 17$

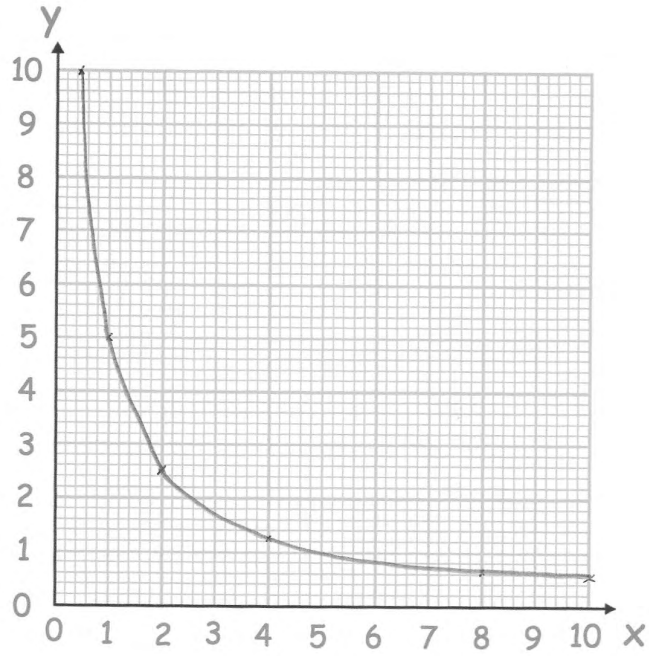
$x = -4$

Reciprocal Graphs - Video 346

284. Complete the table of values for $y = \frac{5}{x}$

x	0.5	1	2	4	8	10
y	10	5	2.5	1.25	0.625	0.5

285. On the grid, draw the graph of $y = \frac{5}{x}$ for $0.5 \leq x \leq 10$

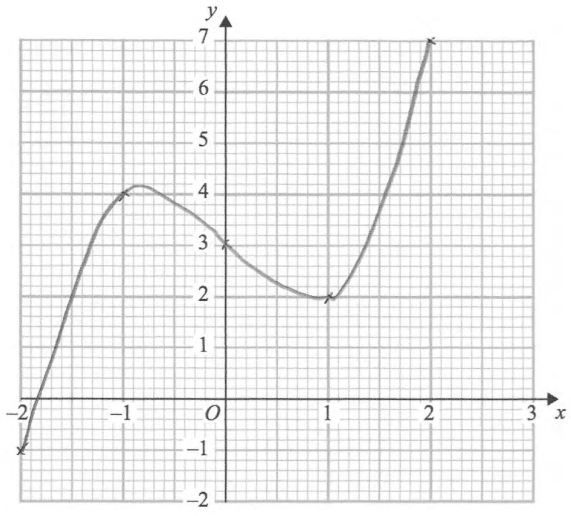


Cubic Graphs - Video 344

286. Complete the table of values for $y = x^3 - 2x + 3$

x	-2	-1	0	1	2
y	-1	4	3	2	7

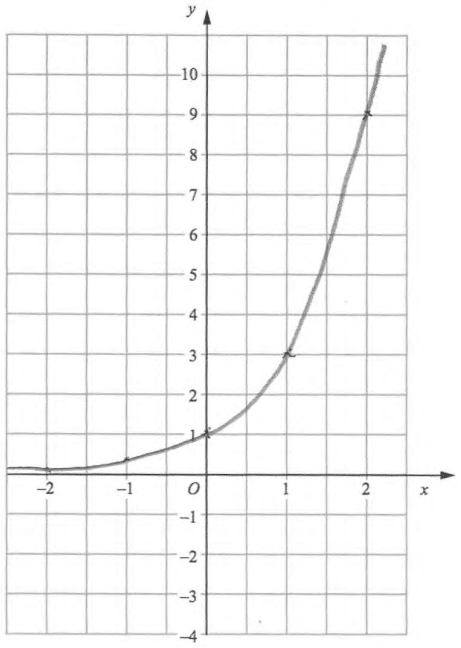
287. On the grid, draw the graph of $y = x^3 - 2x + 3$ for $-2 \leq x \leq 2$



Exponential Graphs - Video 345

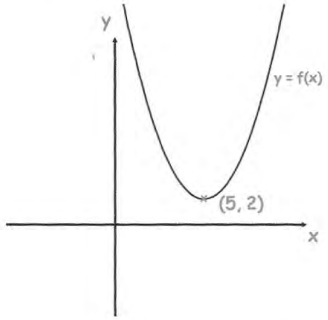
288. Draw $y = 3^x$ for values from -2 to 2

x	-2	-1	0	1	2
y	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9



Transforming Graphs - Video 345

Shown below is the graph of y = f(x)
The coordinates of the minimum point are (5, 2).



Write down the coordinates of the minimum point of the curve with equation.

289. y = f(x) - 1

(5, 1)

290. y = f(-x)

(-5, 2)

291. y = f(x + 1)

(4, 2)

292. y = -f(x)

(5, -2)

Iteration - Video

293. Use the iteration formula $x_{n+1} = \sqrt[3]{5 - \frac{1}{x_n}}$ three times with $x_0 = 1.5$ to find an estimate for the solution of $x^4 - 5x + 1 = 0$

$x_1 = 1.630324416$

$x_2 = 1.636980507$

$x_3 = 1.637290685$

294. $T_{n+1} = 1.2T_n + 800$

In their first season, an ice hockey team sold 1000 season tickets.

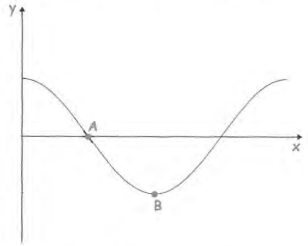
Work out how many season tickets were sold in their fourth season.

1st season : 1000
2nd season : 2000
3rd Season : 3200
4th Season : 4640

4640

Trig Graphs - Video

Here is a sketch of $y = cos(x)$ for $0° \leq x \leq 360°$



295. Write down the coordinates of the point A.

(90, 0)

296. Write down the coordinates of the point B.

(180, -1)

Solving Inequalities - Video 178

297. Solve $4x < 32$

$x < 8$

$x < 8$

298. Solve $5x + 1 > 91$

$5x > 90$

$x > 18$

$x > 18$

299. Solve $7x - 5 \leq 3x + 11$

$4x - 5 \leq 11$

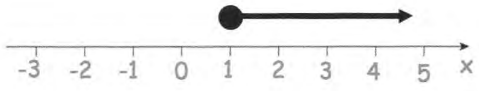
$4x \leq 16$

$x \leq 4$

$x \leq 4$

Inequalities (number line) - Video 177

300.



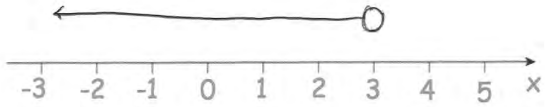
Write down the inequality shown above.

$x \geq 1$

301. Solve the inequality $2x - 1 < 5$ and represent the answer on the number line below.

$2x < 6$

$x < 3$



302. List all the integers that satisfy the inequality $4 < 3n < 15$

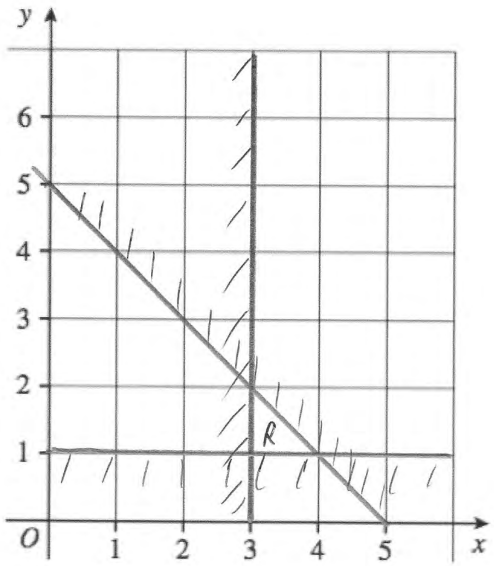
$1.\dot{3} < n < 5$

2, 3, 4

Graphical Inequalities - Video 182

303. On the grid, clearly indicate the region that satisfies all these inequalities.

$x \geq 3$ $y \geq 1$ $x + y \leq 5$

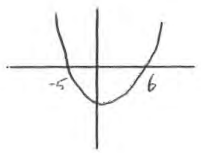


Quadratic Inequalities - Video x

304. Solve the inequality $x^2 - x - 30 < 0$

$(x-6)(x+5) = 0$

$x = 6$ or $x = -5$

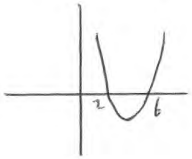


$-5 < x < 6$

305. Solve the inequality $x^2 - 8x + 12 \geq 0$

$(x-6)(x-2) = 0$

$x = 6$ or $x = 2$

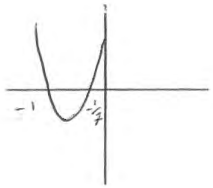


$x \leq 2$ or $x \geq 6$

306. Solve the inequality $7x^2 + 8x + 1 > 0$

$(7x+1)(x+1)$

$x = -\frac{1}{7}$ or $x = -1$



$x < -1$ or $x > -\frac{1}{7}$

Triangular Numbers - Video 229

307. List the first 6 triangular numbers

1 3 6 10 15 21

Fibonacci - Video 287a

308. Here are the first five terms of a Fibonacci sequence.

2 5 7 12 19

Write down the next two terms of the sequence.

31 and 50

---

nth Term - Video 288

309. Find the nth term of 9, 20, 31, 42 ... ...

11n 11 22 33

11n - 2

310. Find the nth term of 50, 48, 46, 44 ... ...

-2n -2 -4 -6 -8

-2n + 52

or

52 - 2n

-2n + 52

311. Find the nth term and the 100th term of 7, 10, 13, 16 ... ...

3n + 4

nth term = 3n + 4

100th term = 304

Arithmetic Progressions - Video 375

312. The first two terms of an arithmetic progression are 3y and 7y.

Find the fifth term of the progression.

+4y

3y 7y 11y 15y 19y

19y

Geometric Progressions - Video 375

313. Circle the geometric progression.

11, 9, 7, 5 ... 1, 4, 9, 16 ... 11, 21, 31, 41 ... 1, 4, 16, 64 ...

314. The third term of a geometric sequence is 48
The fourth term of a geometric sequence is 24

Work out the difference between the first and fifth terms.

192 ×½→ 96 ×½→ 48 ×½→ 24 ×½→ 12

1st 2nd 3rd 4th 5th

180

Quadratic nth Term - Video 388

315. Find the nth term of 7, 11, 17, 25 ...

an^2+bn+c

4 6 8

2 2

2a

$a=1 \quad b=1 \quad c=5$

n^2+n+5

Algebraic Proof - Video 365

316. Prove $(n+2)^2-(n-2)^2+3$ is always odd for all positive integer values of n.

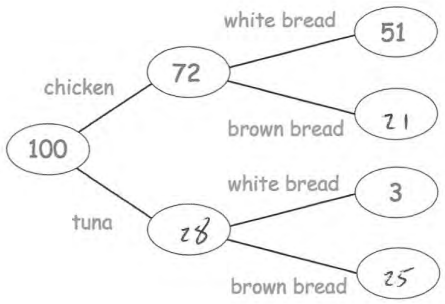
$n^2+4n+4-(n^2-4n+4)+3$

$8n+3$

As $8n$ is even, $8n+3$ must be odd.

Frequency Trees - Video 376

317. Complete the frequency tree.

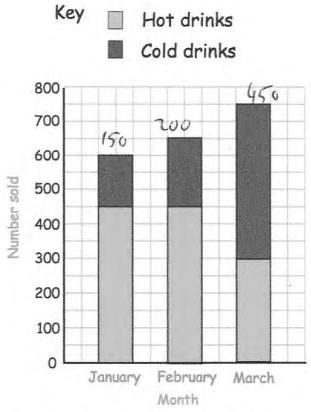


Two-way Tables - Video 319

318. Complete the two-way table.

	T-shirts	Jumpers	Coats	Total
Small	2	36	28	66
Medium	9	0	1	10
Large	58	51	15	124
Total	69	87	44	200

Composite Bar Charts - Video 148b



319. How many cold drinks were sold in total over 3 months?

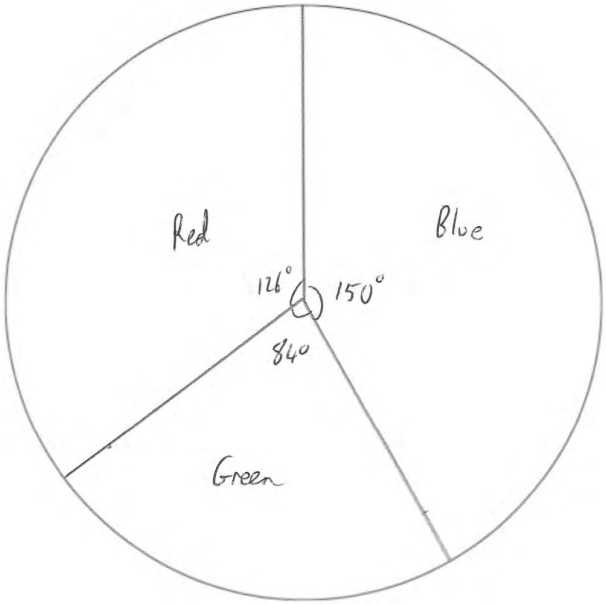
800

Pie Charts - Videos 163, 164

320. Sixty beads are placed in a box.
Draw a pie chart to represent the colours of the beads in the box.

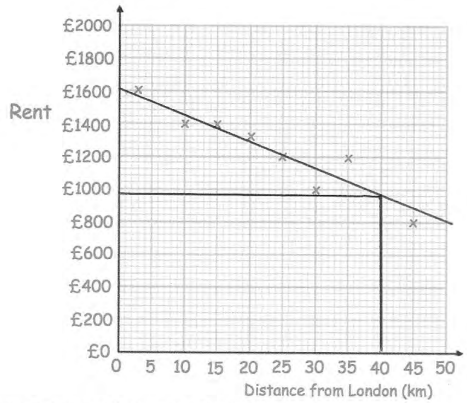
Colour	Frequency	
Blue	25	$\times 6 = 150°$
Green	14	$\times 6 = 84°$
Red	21	$\times 6 = 126°$
	60	

$360 \div 60 = 6°$



Scatter Graphs - Videos 165 to 168

The scatter graph shows information about the cost of renting apartments and their distance from London.



321. What type of correlation is shown?

Negative

322. Estimate the cost of renting an apartment 40km from London.

£ 960

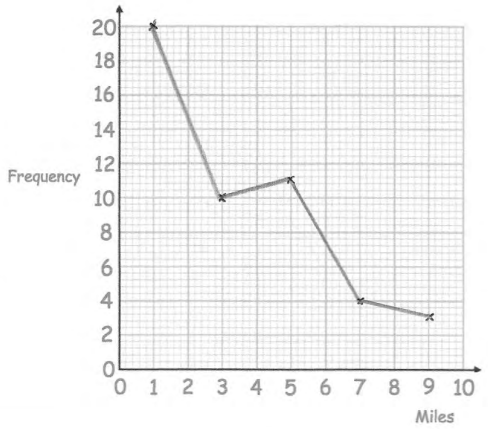
323. Explain why it may not be sensible to use the scatter graph to estimate the cost of renting an apartment that is 75km from London.

It is beyond the range of the data (extrapolation), therefore may not follow the trend.

Frequency Polygons - Videos 155, 156

324. Draw a frequency polygon to represent the data in the table.

Distance (miles)	Frequency
$0 < d \leq 2$	20
$2 < d \leq 4$	10
$4 < d \leq 6$	11
$6 < d \leq 8$	4
$8 < d \leq 10$	3



Mode from a Frequency Table - Video 56a

325. The table shows the number of apples eaten one day by 40 people.

Number of apples	Frequency
0	11
1	14
2	8
3	7

Write down the modal number of apples eaten.

1

Mean from a Frequency Table - Video 54

326. The table shows the number of apples eaten one day by 10 people.

Number of apples	Frequency	fx
0	2	0
1	2	2
2	5	10
3	1	3
		15

Work out the mean number of apples eaten.

$15 \div 10 = 1.5$

1.5

Median from a Frequency Table - Video 51

327. The table shows the number of apples eaten one day by 9 people.

Number of apples	Frequency
0	3
1	4
2	1
3	1

Work out the median number of apples eaten.

$9 + 1 = 10$

$10 \div 2 = 5^{th}$

1

Combined Mean - Video 53a

40+60 = 100

328. There are 40 houses in Greenvale and 60 houses in Redville.

The mean number of cars per house in Greenvale is 1.5
The mean number of cars per house in Redville is 3

Work out the mean number of cars per house in both villages.

40 x 1·5 = 60

60 x 3 = 180

+240

240 ÷ 100 = 2·4

2·4

Estimated Mean - Video 55

329. Work out an estimate for the mean length.

Length (cm)	Frequency	fx
$0 \le L^{15} < 30$	8	120
$30 \le L^{45} < 60$	43	1935
$60 \le L^{75} < 90$	25	1875
$90 \le L^{105} < 120$	4	420
	80	4350

4350 ÷ 80 = 54·375cm

54·375 cm

Modal Class - Video 56a

330. Write down the modal class interval.

Length (cm)	Frequency
$0 \le L < 30$	8
$30 \le L < 60$	43
$60 \le L < 90$	25
$90 \le L < 120$	4

30 ≤ L < 60

Class containing Median - Video 52a

331. Which class interval contains the median?

Length (cm)	Frequency
$0 \le L < 30$	8
$30 \le L < 60$	43
$60 \le L < 90$	25
$90 \le L < 120$	4
	80

*

$\frac{80}{2}$ = 40th (or 40·5th)

30 ≤ L < 60

Median from Grouped Data - Video 52

332. Work out an estimate of the median length.

$\frac{80}{2} = 40^{th}$

Length (cm)	Frequency
$0 \leq L < 30$	8
* $30 \leq L < 60$	43
$60 \leq L < 90$	25
$90 \leq L < 120$	4
	80

32

$30 + \frac{32}{43} \times 30 = 52.3255..$

52.326 cm

Stem-and-Leaf - Videos 169, 170

333. The stem and leaf diagram shows the heights of 14 friends visiting a theme park

Key: 13|5 means 135cm

13	5 7 8
14	1 1 2 6 7 9
15	0 2 7
16	1 8

What fraction of the friends have a height greater than 1.4m?

$\frac{11}{14}$

Quartiles - Video 57b

Here are the ages of 11 people.

20 24 29 30 36 37 41 42 50 55 56

334. Find the lower quartile

29

335. Find the upper quartile

50

336. Find the interquartile range

$50 - 29 = 21$

21

Cumulative Frequency - Videos 153, 154

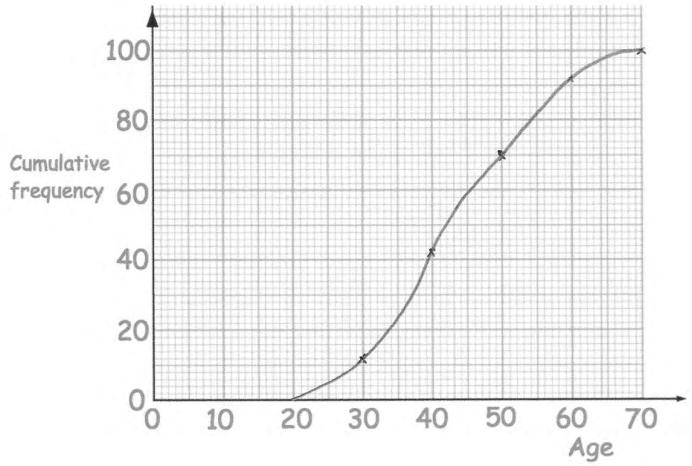
The table below shows the ages of 100 employees.

Age, x years	Frequency
$20 < x \leq 30$	12
$30 < x \leq 40$	30
$40 < x \leq 50$	28
$50 < x \leq 60$	22
$60 < x \leq 70$	8

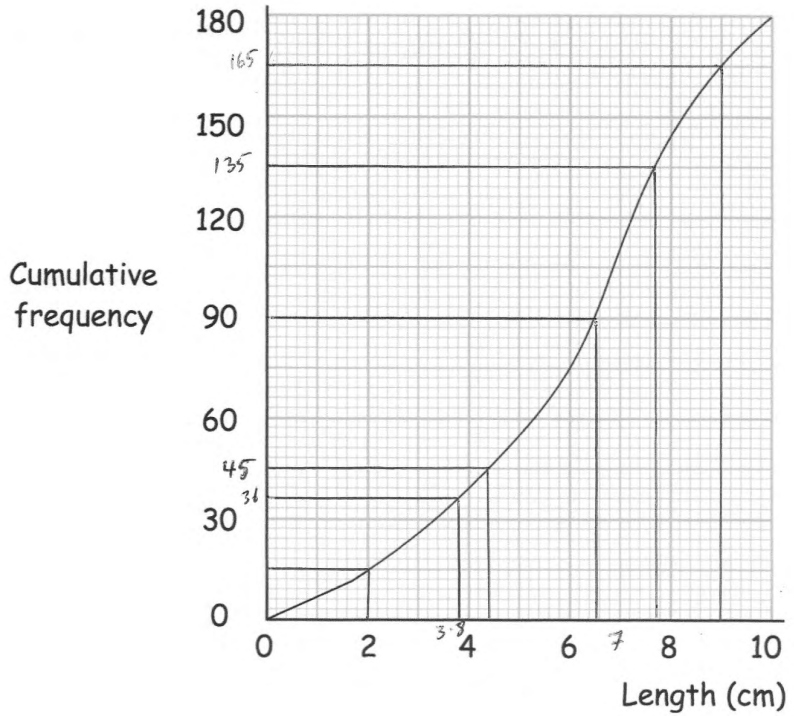
337. Complete the cumulative frequency table.

Age, x years	Cumulative Frequency
$20 < x \leq 30$	12
$20 < x \leq 40$	42
$20 < x \leq 50$	70
$20 < x \leq 60$	92
$20 < x \leq 70$	100

338. Draw a cumulative frequency curve.



180 students were asked to draw a 6cm line.
The cumulative frequency curve shows the actual lengths of their lines.



339. Find an estimate of the median

6.5 .....cm

340. Find an estimate of the lower quartile

$\frac{180}{4} = 45^{th}$

4.4 .....cm

341. Find the interquartile range

UQ 135th → 7.7cm 7.7 - 4.4

3.3 .....cm

342. Estimate how many people drew a line shorter than 2cm

15 .....

343. Estimate how many people drew a line longer than 9cm

180 - 165 = 15

15 .....

344. 20% of people drew a line shorter than x cm
Find an estimate for x.

20% of 180 = 36

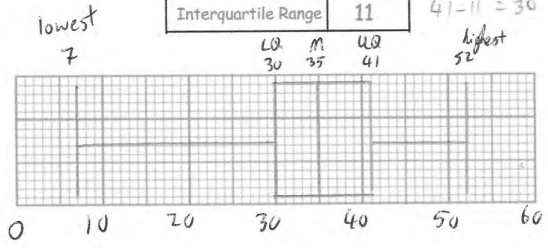
3.8 .....cm

Box Plots - Videos 149, 150

345. Draw a box plot to show this information

Lowest Value	7
Median	35
Upper Quartile	41
Range	45
Interquartile Range	11

7 + 45 = 52
41 - 11 = 30

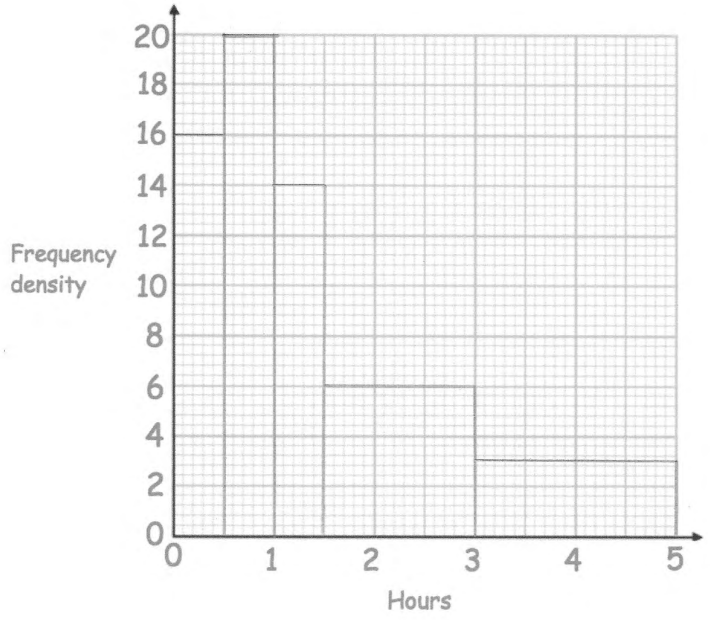


Histograms - Videos 157 to 159, 52

The table below shows the waiting times of 40 patients in a hospital.

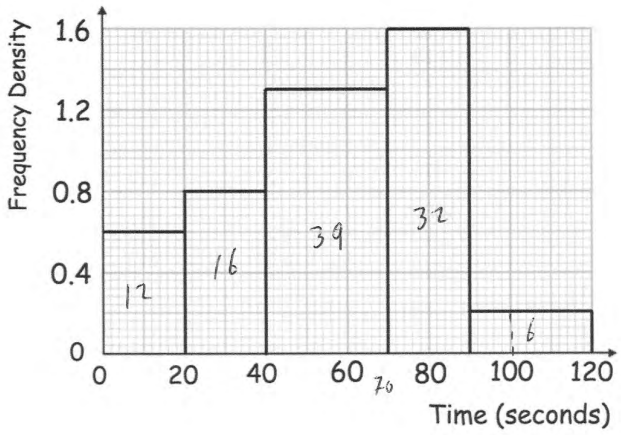
Waiting time, h	Frequency	fd
0 < h ≤ 0.5	8	16
0.5 < h ≤ 1	10	20
1 < h ≤ 1.5	7	14
1.5 < h ≤ 3	9	6
3 < h ≤ 5	6	3

346. Draw a histogram to represent this information.



The histogram shows information about the time taken to answer a question by a group of students.

12 students answered the question in less than 20 seconds.



347. How many students took between 70 and 90 seconds?

$20 \times 1.6 = 32$

32

348. Estimate how many students took longer than 100 seconds.

$30 \times 0.2 = 6$

$\frac{2}{3}$ of 6

4

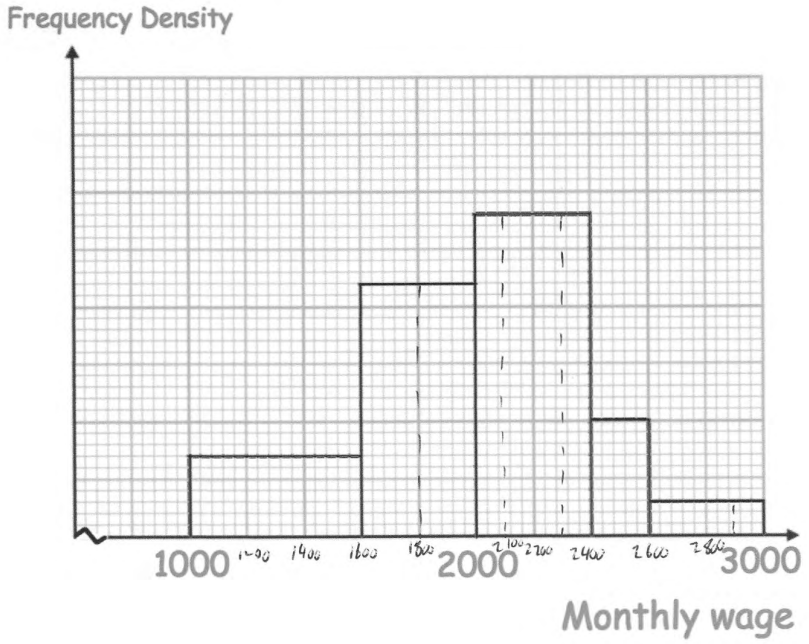
349. What fraction of the students took longer than 40 seconds to answer?

total = 105

$39 + 32 + 6 = 77$

$\frac{77}{105}$ or $\frac{11}{15}$

The histogram below shows the monthly salaries of employees.
There are 216 people who have a monthly salary of between £1800 and £2100.



350. Work out an estimate of how many employees have a salary of between £2300 and £2900

1800 to 2100 → 180 squares for 216 people

$\frac{5}{6}$ of a square per person

2300 to 2900 → 142.5 squares

$142.5 \div \frac{5}{6} = 171$

171

Probability - Video 245

351. There are white, orange, purple and pink beads in a box.

The table shows the probability of selecting a white and an orange bead.
The probability of a purple : probability of a pink = 2 : 5

Complete the table.

2+5=7

Colour	White	Orange	Purple	Pink
Probability	0.29	0.15	0.16	0.4

1 - 0.44 = 0.56

0.56 ÷ 7 = 0.08

0.08 × 2 = 0.16

0.08 × 5 = 0.4

Not Happening - Video 250

352. On a day in December, the probability of it snowing is 0.315

What is the probability of it **not** snowing?

1 - 0.315

0.685

Expectation - Video 248a

353. The probability that a machine makes a faulty lightbulb is 0.008

Last week the machine made 4500 lightbulbs.

Work out how many lightbulbs should be faulty.

4500 × 0.008

36

Relative Frequency - Video 248

David and Becky want to estimate how many yellow jelly beans are in a tub.

A trial consists of taking a jelly bean at random, noting the colour, and replacing the jelly bean in the tub.

	Number of trials	Number of yellow jelly beans chosen
David	20	3
Becky	100	11

354. Write down the relative frequency of David taking a yellow jelly bean.

3/20

355. Write down the relative frequency of Becky taking a yellow jelly bean.

11/100

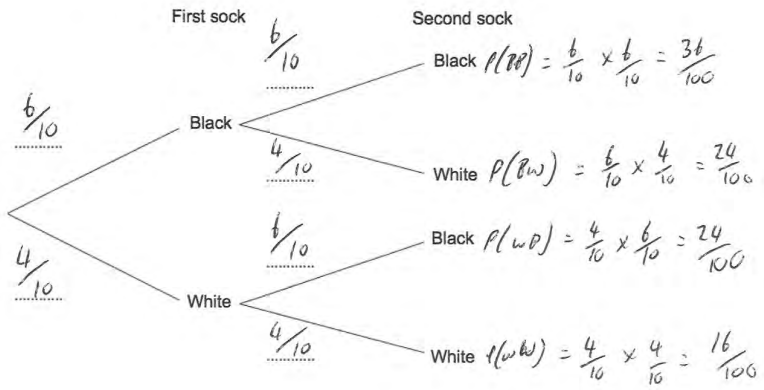
356. Whose experiment gives the more reliable results?
Give a reason for your answer.

Becky - more trials

Tree Diagrams - Video 252

Siobhan has 10 socks in a drawer.
6 socks are black and 4 socks are white.
She picks a sock at random, puts it back and then takes out a second at random.

357. Complete the tree diagram.



358. Work out the probability that the two socks are both white.

$\frac{16}{100}$ or $\frac{8}{50}$ or $\frac{4}{25}$ or 0.16

359. Work out the probability that the two socks are the same colour.

$\frac{36}{100} + \frac{16}{100} = \frac{52}{100}$

$\frac{52}{100}$ or $\frac{13}{25}$ or 0.52

360. Work out the probability that the two socks are different colours.

$1 - \frac{52}{100} = \frac{48}{100}$

$\frac{48}{100}$ or $\frac{12}{25}$ or 0.48

Independent Events - Video 249

361. Jackson and Kelvin each sit a test.

The probability that Jackson passes is 0.8
The probability that Kelvin passes is 0.6

Find the probability that both of them pass.

$0.8 \times 0.6 = 0.48$

0.48

Conditional Probability - Video 247

Dexter has 7 red and 5 green socks in a bag.
He takes out two socks at random from the bag, without replacement.

362. Find the probability that the two socks are the same colour.

$P(RR) = \frac{7}{12} \times \frac{6}{11} = \frac{42}{132}$

$P(GG) = \frac{5}{12} \times \frac{4}{11} = \frac{20}{132}$

$\frac{62}{132}$

$\frac{31}{66}$

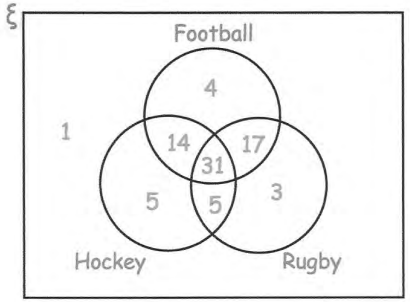
363. Find the probability that the two socks are different colours.

$1 - \frac{31}{66} = \frac{35}{66}$

$\frac{35}{66}$

Venn Diagrams - Video 380

Jennifer asked 80 people which sports they enjoy from football, hockey and rugby.



364. How many people enjoy all three sports?

31

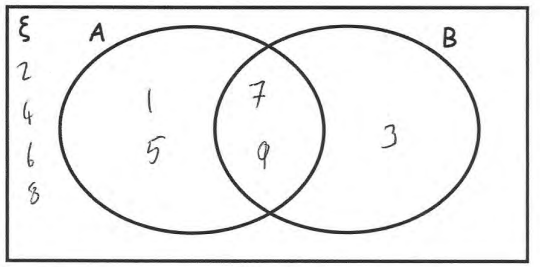
365. How many people enjoy football and rugby but not hockey?

17

366. $\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$A = \{1, 5, 7, 9\}$
$B = \{3, 7, 9\}$

Complete the Venn diagram



A number is chosen at random, find the probability of:

367. P(A')

5/9

368. P(A∪B)

5/9

369. P(A∩B)

2/9

Samples - Video 281a

Mrs Martin wants to open a new restaurant in her town.
She wants to find out what type of food people in her town like.

370. Caolán suggests that she posts a survey to 100 people chosen at random across the country.

Explain why this is not sensible.

As they are around the entire county, they may not reflect local opinion.

371. Jack suggests that she surveys 5 people in the town centre.

Explain how Jack's suggestion could be improved.

Survey more people

Capture Recapture - Video 391

Kathryn wants to estimate how many fish live in a pond.

On Monday, she captures and tags 60 fish.
She then releases them back into the pond.

On Wednesday, Kathryn captures 40 fish.
6 of the fish are tagged.

372. Estimate how many fish live in the pond.

$\frac{60}{N} = \frac{6}{40}$

$6N = 2400$

$N = 400$

400