GRADEUP

AQA (GCSE Notes)

Chapter 2: Ratio, proportion and rates of change

Q1. A car travels 180 miles in 4 hours. How long would it take the same car to travel 315 miles at the same speed?

Q2. A worker is paid £13.50 per hour. How much does she earn for working 37.5 hours?

Q3. A recipe requires 200 g of flour for 8 cookies. How much flour is needed for 30 cookies?

Q4. A block of metal has a mass of 540 g and a volume of 90 cm^3. Calculate its density.

Q5. Water is leaking from a tank at a constant rate. After 3 hours, 7.5 litres have leaked. How much would have leaked after 8 hours?

Q6. The mass of 6 identical balls is 2.4 kg. What is the mass of 10 such balls?

Q7. A person runs 800 m in 2 minutes. Find their average speed in metres per second.

Q8. A machine produces 45 units in 3 hours. How many units can it produce in 8 hours?

Q9. A car accelerates from 0 to 60 mph in 8 seconds. Find the average acceleration.

Q10. A student earns £270 for working 18 hours. What is their hourly rate of pay?

Q11. Convert 1.75 hours into minutes.

Q12. A cyclist travels 40 km in 2 hours and 30 minutes. Calculate the speed in km/h.

Q13. A builder mixes cement in the ratio 5:2:1 of sand, gravel, and cement. If he uses 84 kg of gravel, how much sand does he need?

Q14. A bottle contains 1.5 litres of juice. How many millilitres is this?

Q15. The pressure on a surface is 60 N/m^2 and the force is 1200 N. Find the area.

Q16. The density of a liquid is 1.2 g/cm^3. What is the mass of 500 cm^3 of this liquid?

Q17. A bus travels 120 miles in 2.5 hours. What is its average speed?

Q18. Convert 2.4 km^2 to m^2.

Q19. A person walks 6 km at 4 km/h. How long does the journey take?

Q20. A job takes 6 men 10 days. How many days will it take 4 men, working at the same rate?

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Q21. A car travels 90 km at an average speed of 60 km/h. How long does the journey take in minutes?

Q22. Convert 0.85 m^3 into litres.

Q23. A mixture contains water and alcohol in the ratio 3:2. If the total volume is 750 mL, how much is alcohol?

Q24. The area of a rectangle is 48 cm^2. If the length is 6 cm, what is the width?

Q25. A cylinder has a height of 10 cm and volume of 942 cm^3. Find the radius of the base (use $\pi = 3.14$).

Q26. A person earns £15 per hour for the first 40 hours and £22.50 for any extra hours. How much do they earn in a week if they work 48 hours?

Q27. The density of a substance is 8.5 g/cm^3. What volume is occupied by 255 g of the substance?

Q28. A machine produces 480 units in 6 hours. How many units does it produce per minute?

Q29. A pipe fills a tank in 3 hours. Another pipe can fill the same tank in 5 hours. How long will it take to fill the tank if both pipes work together?

Q30. A car travels 180 km in 2.25 hours. Calculate its average speed.

Q31. A cube has a volume of 125 cm^3. What is the length of one side?

Q32. A shop reduces the price of an item by 20%. The original price was £75. What is the new price?

Q33. A train travels 225 miles in 3 hours and 45 minutes. What is its average speed in mph?

Q34. If 6 pencils cost £2.70, what is the cost of 14 pencils?

Q35. A metal rod weighs 2.4 kg and is 120 cm long. What is the weight per metre?

Q36. A container holds 2.5 litres of paint. How many containers are needed to paint 45 m^2 if 1 litre covers 6 m^2?

Q37. A person runs a marathon of 42.2 km in 3 hours and 20 minutes. What is their average speed?

Q38. A garden path is 1.2 m wide and 8 m long. What is its area in square centimetres?

Q39. A car uses 6 litres of fuel to travel 90 km. How much fuel is needed to travel 150 km?

Q40. A recipe that serves 4 people uses 300 g of flour. How much flour is needed to serve 10 people?

Q41. A box of cereal weighs 750 g. Convert this to kilograms.

Q42. The exchange rate is £1 = €1.18. How many euros would you get for £250?

Q43. The population of a town increases by 3% per year. If the current population is 12,000, what will it be next year?

Q44. A factory produces 240 units in 8 hours. How many units are produced per hour?

Q45. A bag of sugar weighs 1.5 kg. How many 250 g jars can be filled from one bag?

Q46. A boat travels 84 miles downstream in 4 hours. What is the speed of the boat?

Q47. The ratio of boys to girls in a class is 5:4. If there are 36 students in total, how many girls are there?

Q48. A tank has a volume of 0.75 m^3. Convert this to litres.

Q49. A person cycles at 15 km/h for 2.5 hours. How far do they travel?

Q50. A rectangular room is 5 m by 4.5 m. What is the area in square centimetres?

Q51. A tank holds 180 litres of water. It is emptied over 3 hours at a constant rate. How many litres of water are released per minute?

Q52. A cyclist covers 36 km in 1 hour 20 minutes. What is their average speed in km/h?

Q53. A car travels 150 miles using 12 gallons of fuel. What is the car's fuel consumption in miles per gallon?

Q54. Convert a speed of 72 km/h into m/s.

Q55. A cylindrical tank has a volume of 1.2 m^3. Convert this volume into litres.

Q56. The density of a metal is 7.8 g/cm^3 and its volume is 250 cm^3. Calculate its mass.

Q57. A block has a mass of 2.5 kg and a volume of 0.0005 m^3. Find the density in kg/m^3.

Q58. The pressure exerted by a force of 300 N on a surface is 50 N/m^2. Calculate the area of the surface.

Q59. If 5 workers can complete a task in 12 days, how long would 8 workers take, working at the same rate?

Q60. A recipe that serves 8 uses 240 g of sugar. How much sugar is needed for a recipe that serves 5?

Q61. The cost of 7 kg of rice is £19.25. What is the cost of 3.5 kg of rice?

Q62. A car travels 40 km in 32 minutes. Calculate its speed in km/h.

Q63. A car moves with constant acceleration and its speed increases from 20 m/s to 40 m/s in 5 seconds. Find the acceleration.

Q64. Divide £84 between A and B in the ratio 5:7.

Q65. Divide 270 ml of a solution into two parts in the ratio 2:7.

Q66. Express 4:11 as a part : whole ratio.

Q67. Express the division of 80 items into two parts as a ratio, where one part is 20 and the other is 60.

Q68. In a mixture of juice and water in the ratio 3:2, how much juice is there if the total mixture is 1.25 litres?

Q69. In a class of 40 students, the ratio of girls to boys is 3:5. How many girls are there?

Q70. A map has a scale of 1:25,000. What is the actual distance in kilometres if the map distance is 8 cm?

Q71. A model car is built to a scale of 1:20. If the actual car is 4.2 m long, what is the length of the model in cm?

Q72. A rectangle is enlarged by a scale factor of 1.5. Its original area is 48 cm^2. What is the area of the enlarged rectangle?

Q73. A cube has a surface area of 150 cm^2. It is scaled by a factor of 2. What is the surface area of the scaled cube?

Q74. A jug contains a drink made by mixing orange juice and water in a 5:3 ratio. If there is 2 litres of water, how much orange juice is needed?

Q75. A car was purchased for £8,000. Its value depreciates by 15% per year. What is its value after one year?

Q76. A population of 5000 increases by 4% per year. What will the population be after one year?

Q77. A bank offers compound interest at 3% annually. How much will £2000 grow to after one year?

Q78. A value grows from 150 to 180. Calculate the percentage increase.

Q79. A value reduces from 260 to 208. Calculate the percentage decrease.

Q80. A car travels 160 km in 2.4 hours. What is its average speed?

Q81. A packet of cereal weighing 1.2 kg is shared between two people in the ratio 5:7. How much cereal does each person receive?

Q82. A total of £96 is to be divided between three people in the ratio 2:3:7. Calculate each person's share.

Q83. A quantity is divided into two parts in the ratio 5:3. If the smaller part is 24, find the larger part.

Q84. In a school, the number of boys is 60% of the number of girls. Express the number of boys as a fraction of the total number of students.

Q85. A to B is in the ratio 2:3, and B to C is in the ratio 4:5. What is the simplified ratio of A:B:C?

Q86. If £36 is shared in the ratio 1:3, express the smaller share as a fraction of the total.

Q87. The mass of sugar in a mixture is 120 g, which is 3/5 of the total mass. What is the total mass?

Q88. A box contains red, blue and green balls in the ratio 2:5:3. If there are 60 balls in total, how many are green?

Q89. The ratio of width to height of a rectangle is 4:3. If the width is 28 cm, what is the height?

Q90. A map shows two towns 12 cm apart. The scale of the map is 1:100,000. What is the real distance in km?

Q91. A chemical solution is made by mixing acid and water in the ratio 1:4. If there are 300 ml of water, how much acid is needed?

Q92. A floor is to be tiled with square tiles. Each tile measures 30 cm by 30 cm. If the area of the floor is 9 m^2, how many tiles are needed?

Q93. A factory produces 320 items in 5 hours. How many items does it produce per minute?

Q94. A machine fills 12 bottles in 4 minutes. How long does it take to fill 54 bottles?

Q95. A recipe uses 300 g of flour to make 12 cupcakes. How much flour is needed for 30 cupcakes?

Q96. A 2.5 m^3 container is filled with oil. Convert the volume into litres.

Q97. The ratio of cats to dogs in a shelter is 3:4. If there are 84 animals, how many are cats?

Q98. A train travels 180 miles in 3 hours. What is its average speed?

Q99. A salary increases from £1200 to £1320. What is the percentage increase?

Q100. A compound increases in value by 5% annually. If its current value is £1500, what will it be after one year?

Q101. A recipe requires flour and sugar in the ratio 3:2. If you have 480 g of flour, how much sugar is needed?

Q102. A map has a scale of 1:50,000. If two towns are 7.5 cm apart on the map, what is their actual distance in kilometres?

Q103. A car travels 180 miles using 15 gallons of fuel. How many miles per gallon does the car achieve?

Q104. If the pressure exerted by a force of 400 N on a surface is 80 N/m², find the area of the surface.

Q105. The density of a metal is 8.4 g/cm³. Calculate the mass of a 250 cm³ block of the metal.

Q106. A train travels at an average speed of 75 km/h. How long will it take to cover 225 km?

Q107. The value of a machine depreciates by 12% per year. If it is currently worth £8,000, what was its value a year ago?

Q108. A tank fills in 6 hours when water is pumped in at a constant rate. How long will it take to fill 5 such tanks?

Q109. A laptop originally costing £1,200 is now being sold at a 25% discount. What is the sale price?

Q110. The surface area of a cube increases by a scale factor of 4. What is the scale factor of the side length?

Q111. If 3 workers complete a job in 10 days, how many days would it take 5 workers to complete the same job?

Q112. A quantity increases from 240 to 312. Calculate the percentage increase.

Q113. A solution is made by mixing acid and water in the ratio 2:5. If there are 150 ml of water, how much acid is used?

Q114. Express 72 as a percentage of 300.

Q115. A population increases by 8% each year. What will be the population after 2 years if the current population is 25,000?

Q116. A car's speed changes from 60 km/h to 90 km/h in 10 seconds. What is the average acceleration?

Q117. A machine produces 360 units in 45 minutes. What is its production rate in units per hour?

Q118. If the ratio of girls to boys in a class is 5:6 and there are 22 girls, how many boys are there?

Q119. The pressure on a surface is 100 N/m² and the area is 0.5 m². Calculate the force exerted.

Q120. Convert a speed of 90 km/h to metres per second.

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Q121. A pipe can fill a tank in 4 hours. A second pipe can fill it in 6 hours. How long will it take to fill the tank if both pipes are used together?

Q122. A jacket is marked down by 30% in a sale. Its sale price is £56. What was the original price?

Q123. A car uses 12 litres of petrol to travel 180 km. Calculate the fuel efficiency in km per litre.

Q124. The ratio of red to blue balls in a bag is 3:4. If there are 56 balls in total, how many are red?

Q125. A company's revenue increases from £50,000 to £65,000. What is the percentage increase?

Q126. A train travels at a constant speed and covers 180 km in 2.25 hours. What is its speed in km/h?

Q127. A tank contains water and oil in the ratio 2:3. If the total volume is 25 litres, how much oil is in the tank?

Q128. A student scored 18 out of 30 in a test. Express the score as a percentage.

Q129. A pair of shoes originally cost £80. After a 15% discount, what is the new price?

Q130. If the mass of an object is 5.6 kg and its volume is 0.007 m^3, find its density in kg/m^3.

Q131. Two quantities are in the ratio 7:5. If the larger quantity is 49, find the smaller.

Q132. A factory produces 1200 items in 5 hours. How many items are produced per minute?

Q133. A cyclist covers 24 km in 1.5 hours. What is the average speed?

Q134. A population of 18,000 grows by 5% per year. Find the population after one year.

Q135. Express 9:4 as a fraction of the whole.

Q136. A mixture contains alcohol and water in the ratio 3:7. If there are 84 litres in total, how much alcohol is present?

Q137. A car depreciates by 10% each year. What is its value after one year if originally worth £18,000?

Q138. A triangle's side lengths are increased by a scale factor of 3. By what scale factor does the area increase?

Q139. A painter charges £15 per hour. How much would it cost for 6 hours and 30 minutes of work?

Q140. A train travels 144 miles in 3 hours and 36 minutes. Calculate its average speed in mph.

Q141. A £40 shirt is reduced by 35% in a sale. What is the sale price?

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Q142. A school has a student to teacher ratio of 25:1. If there are 400 students, how many teachers are there?

Q143. A quantity increases from 320 to 400. What is the percentage increase?

Q144. A 2.5 m^3 container is filled with a liquid. Convert this volume into litres.

Q145. A loan of £5,000 accumulates simple interest at 6% per annum. What is the interest after one year?

Q146. A cyclist rides 84 km in 3 hours. How many minutes would it take to ride 56 km at the same speed?

Q147. A metal alloy is made from copper and zinc in the ratio 5:3. If there are 120 g of zinc, how much copper is used?

Q148. A company's profit falls from £240,000 to £192,000. Calculate the percentage decrease.

Q149. A car travels 120 km in 80 minutes. Calculate the speed in km/h.

Q150. A population of 9600 is made up of adults and children in the ratio 5:7. How many are children?

Q151. A sum of money increases by 12% per year. If it's now £560, what was it a year ago?

Q152. A train covers 150 km in 1 hour and 40 minutes. Find the average speed in km/h.

Q153. A force of 900 N is applied over an area of 3 m^2. What is the pressure?

Q154. A map scale is 1:25,000. How many cm on the map represent 2.5 km in real life?

Q155. A £90 jacket is increased in price by 20%. What is the new price?

Q156. A car uses 50 litres of petrol to travel 650 km. What is the fuel consumption in km/litre?

Q157. A 3:2 ratio of boys to girls represents 45 children. How many are girls?

Q158. A speed of 20 m/s is equivalent to how many km/h?

Q159. If a 15% tip is added to a £60 bill, what is the total amount paid?

Q160. A student earns £12 per hour. How much will they earn in a 37.5-hour week?

Q161. A bottle contains a solution with water and alcohol in the ratio 4:1. If there is 1.2 litres of alcohol, how much water is there?

Q162. A phone is reduced by 30% in a sale and now costs £350. What was the original price?

Q163. A lorry travels 360 km in 4.5 hours. Find the average speed.

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Q164. A cylinder has a volume of 0.75 m³. Convert this volume into litres.

Q165. A factory produces 450 units in 75 minutes. What is the production rate in units per hour?

Q166. A bag of flour weighs 2.5 kg. A recipe uses 0.4 kg per cake. How many full cakes can be made?

Q167. A person walks 1.8 km in 20 minutes. What is their speed in km/h?

Q168. A block has a mass of 4.5 kg and a volume of 0.003 m³. Find its density.

Q169. The price of a laptop increases from £480 to £600. Find the percentage increase.

Q170. A job pays £9.50 per hour. How much is earned in 7 hours and 15 minutes?

Q171. A mixture contains paint and thinner in a 5:1 ratio. If there is 7.5 litres of thinner, how much paint is used?

Q172. A person invests £2,000 at 5% simple interest per annum. What will the value be after one year?

Q173. A class has 24 girls and 16 boys. Express the ratio of girls to boys in simplest form.

Q174. A car's value depreciates by 18% in a year. If the value is now £12,300, what was it a year ago?

Q175. A triangle's base and height are scaled by a factor of 3. How is the area affected?

Q176. A job is completed by 4 workers in 15 days. How many days would it take 6 workers?

Q177. A journey takes 2 hours 30 minutes at an average speed of 84 km/h. What is the total distance?

Q178. A map distance of 4 cm represents 1.2 km. What is the map scale?

Q179. A machine makes 72 parts in 90 minutes. How many does it make in 4 hours?

Q180. A discount of 20% is applied to a price of £350. What is the final amount?

Q181. A metal block has a density of 7.2 g/cm³ and a volume of 300 cm³. Find its mass.

Q182. A student's mark improves from 64 to 80. What is the percentage increase?

Q183. The ratio of cats to dogs in a shelter is 5:3. If there are 64 animals, how many are dogs?

Q184. A bicycle is bought for £240 and sold for £180. What is the percentage loss?

Q185. A recipe uses ingredients in the ratio 2:3:5. If the total weight is 1 kg, how much is each ingredient?

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Q186. A lorry's load weighs 2.4 tonnes. Convert this weight into kilograms.

Q187. A car travels 132 km in 1 hour and 36 minutes. What is the speed in km/h?

Q188. A £500 laptop increases in price by 8%. What is the new price?

Q189. A field has an area of 4.8 hectares. Convert this to m^2.

Q190. A salary is £2400 per month. What is the annual salary?

Q191. A factory's output grows by 6% per year. If current output is 10,000 units, what was it a year ago?

Q192. The mass of a cube is 250 g and its volume is 50 cm^3. What is the density?

Q193. A train increases its speed from 80 km/h to 120 km/h. What is the percentage increase?

Q194. A shop buys items at £3 each and sells them at £5. What is the percentage profit?

Q195. A compound value grows 10% each year. If it's now £1,100, what was it a year ago?

Q196. A triangle's area is 120 cm^2. After enlargement by scale factor 2, what is the new area?

Q197. A worker is paid £11 per hour for weekdays and £15 on weekends. If they work 35 weekday hours and 8 weekend hours, what is the total pay?

Q198. A population decreased from 30,000 to 24,000. Find the percentage decrease.

Q199. A fuel tank holds 40 litres. If the car uses 8 litres per 100 km, how far can it travel?

Q200. A phone plan charges £15 per month plus £0.10 per text. How much is the bill for 120 texts?

Q201. A cyclist covers 72 km in 3 hours. What is their average speed in km/h?

Q202. A worker earns £9.80 per hour. How much will they earn for working 42 hours?

Q203. A shop sells 5 apples for £1.45. Find the unit price for one apple.

Q204. A block of metal has a mass of 450 g and a volume of 150 cm^3. Calculate the density of the metal.

Q205. A force of 600 N is applied to an area of 0.5 m^2. Work out the pressure in N/m^2.

Q206. A cube has side length 6 cm. What is its volume?

Q207. Two similar rectangles have lengths in the ratio 2:5. What is the ratio of their areas?

Q208. The sides of a triangle are enlarged by a scale factor of 3. What is the scale factor of the new area?

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Q209. The volume of a sphere is increased by a scale factor of 4. What is the scale factor of its radius?

Q210. Two cylinders are similar. The height of the smaller one is 5 cm and the height of the larger one is 15 cm. Find the ratio of their volumes.

Q211. A triangle has angles 30°, 60°, and 90°. One side is 6 cm. Use trigonometric ratios to find another side.

Q212. In a right-angled triangle, the hypotenuse is 13 cm and one side is 5 cm. Find the size of one of the other angles.

Q213. X is inversely proportional to Y. If Y = 4 when X = 10, find the equation linking X and Y.

Q214. X is directly proportional to Y. If Y = 3 when X = 9, write the equation linking X and Y.

Q215. When a car travels at 60 mph, the journey takes 2 hours. If the speed is reduced to 40 mph, how long does the journey take?

Q216. The time taken to do a job is inversely proportional to the number of workers. If 4 workers take 6 days, how long would 8 workers take?

Q217. The gradient of a line is 3. What is the rate of change of y with respect to x?

Q218. A straight line has the equation $y = 2x + 5$. What does the gradient represent?

Q219. On a graph, a curve passes through the point (3, 4). Draw a tangent at that point and estimate the gradient.

Q220. Find the average rate of change between $x = 1$ and $x = 5$ for the function $y = x^2$.

Q221. A population of 500 people grows by 4% each year. What is the population after 3 years?

Q222. A machine loses 3% of its value each year. If it is worth £500 now, what is its value after 5 years?

Q223. £200 is invested at a compound interest rate of 5% per annum. What is the value after 2 years?

Q224. A town's population increases by 2.5% per year. Use an iterative process to estimate the population after 4 years if it starts at 10,000.

Q225. Use iteration to solve $x = \sqrt{(10 + x)}$, starting with $x_0 = 2$. Perform three steps.

Q226. A quantity grows exponentially according to the formula N = 100(1.02)^t. What does 1.02 represent?

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Q227. A ladder leans against a wall, making an angle of 70° with the ground. The ladder is 5 m long. How high up the wall does it reach?

Q228. A 3D model is made with a scale factor of 1:50. If the model is 6 cm tall, how tall is the real object?

Q229. Two squares are similar. The side of the smaller one is 4 cm, and the side of the larger is 10 cm. Find the ratio of their areas.

Q230. The pressure in a gas cylinder is 2000 Pa when the area is 0.5 m^2. Find the force applied.

Q231. A car travels 120 km in 1.5 hours. Calculate its speed in m/s.

Q232. If density is 7.8 g/cm^3 and the volume is 250 cm^3, find the mass.

Q233. A car uses 8 litres of fuel for 100 km. How many litres will it use for 350 km?

Q234. A graph shows distance against time. Explain how you can find the speed from the graph.

Q235. The height of a cone is increased by scale factor 2. What happens to the volume?

Q236. The surface area of two similar pyramids is in the ratio 1:9. What is the ratio of their heights?

Q237. X is proportional to 1/Y. If Y = 2, X = 6. Find X when Y = 8.

Q238. A straight line goes through (0, 2) and (3, 11). Find its gradient.

Q239. Find the gradient of the curve $y = x^2$ at $x = 3$ using the tangent method.

Q240. Explain how the gradient of a chord estimates the average rate of change between two points.

Q241. A car's speed increases from 30 mph to 50 mph in 10 seconds. Find the average acceleration.

Q242. A rectangular tank holds 6000 litres of water and is 2 metres long and 1.5 metres wide. Find its height in metres.

Q243. A person earns £2500 per month. What is their annual income?

Q244. A builder is paid £150 for 8 hours of work. What is the rate of pay per hour?

Q245. A triangle has sides 5 cm, 12 cm and 13 cm. Show it is a right-angled triangle.

Q246. Use trigonometry to find the angle in a triangle where the opposite side is 7 cm and the hypotenuse is 14 cm.

Q247. Sketch a graph of a function showing inverse proportion.

Q248. Sketch a graph of $y = 3x$ and describe its gradient.

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Q249. Use a tangent to estimate the rate of change at $x = 2$ for $y = x^3$.

Q250. A value triples every 5 years. If the current value is £200, what will it be in 10 years?

Q251. A car loses 15% of its value each year. If it's worth £12,000 now, estimate its value in 3 years.

Q252. A house value increases by 2% per month. If it is worth £150,000 now, what is it worth in 6 months?

Q253. Find the unit cost of 7 pencils costing £3.15.

Q254. Find the density of an object with mass 5.2 kg and volume 2.5 m^3.

Q255. Explain how pressure changes when force increases but area remains constant.

Q256. A population of 8000 increases at a rate of 1.5% per year. How many people after 2 years?

Q257. An investment grows from £2000 to £2200 in 2 years. Find the annual percentage growth rate.

Q258. A length of 4.5 m is increased by 60%. Find the new length.

Q259. A company makes 5 widgets in 2 hours. How many widgets in 10 hours?

Q260. A straight line passes through (1, 2) and (4, 8). Find its gradient.

Q261. Use iteration to solve $x = (6 + x)/2$, starting with $x = 1$.

Q262. In a right-angled triangle, $\sin \theta = 0.6$. Find θ.

Q263. A line has gradient 4. What is the change in y when x increases by 3?

Q264. If area is proportional to the square of the scale factor, what happens to the area if the scale factor is doubled?

Q265. Two cones are similar. Their heights are in the ratio 3:5. Find the ratio of their volumes.

Q266. A truck travels 250 km in 3.5 hours. Find the speed in km/h.

Q267. An object is 2.5 m tall in real life and 5 cm tall in a model. Find the scale factor.

Q268. A ball bounces to 80% of its previous height each time. If the first bounce is 2 m, how high is the third?

Q269. A salary increases by 3% each year. How many years until it grows by at least 10%?

Q270. Estimate the gradient of $y = x^2 + 1$ at $x = 2$ using a tangent.

Q271. A graph shows speed-time. What does the gradient represent?

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Q272. A boat travels 240 km in 5 hours. Find the average speed.

Q273. A model is made with scale 1:100. What is the real length if the model is 7 cm?

Q274. An object loses half its value every year. If it's worth £400 now, what will it be worth in 3 years?

Q275. A tank fills at a constant rate. After 4 minutes, it contains 80 litres. How much in 7 minutes?

Q276. The side of a square increases by 50%. Find the percentage increase in area.

Q277. Water flows at 6 litres per minute. How much flows in 45 minutes?

Q278. A graph shows the curve $y = \sqrt{x}$. Estimate the gradient at $x = 4$.

Q279. X and Y are inversely proportional. If X = 6 and Y = 2, find Y when X = 3.

Q280. A straight line has the equation $y = 4x - 1$. What is the rate of change of y with respect to x?