

Oxford Revise | Edexcel GCSE Maths Higher | Answers

Chapter 17 Compound measures and multiplicative reasoning

Question	Answer	Extra information	Marks
17.1	$\text{Rate} = \frac{\text{Volume}}{\text{time}}$ $20 = \frac{2400}{t}$ $t = \frac{2400}{20}$ $t = 120$ Time = 120 seconds	2400 ÷ 20 Correct answer, including units	1 1
17.2	$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{38\,700}{5} = 7740 \text{ kg/m}^3$	Convert g to kg Use of the formula for density Correct answer	1 1 1
17.3 (a)	$\text{Speed} = \frac{\text{distance}}{\text{time}}$ $47 = \frac{5.64}{t}$ $t = \frac{5.64}{47} = 0.12 \text{ hours}$ 0.12 hours = 7.2 minutes 0.2 minutes = 12 seconds Therefore, time is 7 minutes and 12 seconds	Convert to consistent units Attempt to use formula to find the time 0.12 hours Correct answer	1 1 1 1

Question	Answer	Extra information	Marks
17.3 (b)	0.78 m per minute = 0.0468 km/h So, the snail is slightly faster	Convert to consistent units 0.78 m per minute = 0.0468 km/h Correct conclusion	1 1 1
17.4	<i>Dogs Love Bach</i> : 9 kg for £12.99 Unit cost = £1.44333... for 1 kg <i>Woof & Ready</i> : 8 kg for £11.00 Unit cost = £1.375 for 1 kg, which is the better value	At least one of dividing costs by 9 or 8 £1.44... or £1.375 Comparison of correct answers with correct conclusion (i.e. <i>Woof & Ready</i> is cheaper)	1 1 1
17.5	France: $58\,800 \div 12 = 4900$ euros per acre Argentina: $4520\,000 \div 64.19 = 70\,415.952\,64$ euros $70\,415.952\,64 \div 15 = 4694.39...$ euros per acre Lower cost per acre in Argentina	$58\,800 \div 12 (= 4900)$ $4520\,000 \div 64.19 (= 70\,415.9...)$ 4900 and 4694(.3...) with correct conclusion (i.e. Argentina is cheaper)	1 1 1
17.6 (a)	$12 \times 6 = 72$ painter days' $72 \div 18 = 4$ days	$12 \times 6 \div 18$, or equivalent Correct answer	1 1
17.6 (b)	$72 \div 3 = 24$ painters	$12 \times 6 \div 3$, or equivalent Correct answer	1 1

Question	Answer	Extra information	Marks
17.6 (c)		<p>Correct shape Graph approaches (but does not touch) both sets of axes.</p>	<p>1 1</p>
17.7	$T = \frac{k}{W}$ $5 = \frac{k}{4}$ $\Rightarrow k = 20$ $T = \frac{20}{8} = 2.5$	<p>Setting up a formula to represent the inverse relationship Correct answer</p>	<p>1 1</p>
17.8 (a)	$p = kq$ $\Rightarrow k = 12.5$ $p = 12.5q$	<p>Use given values to find k. Write formula for p in terms of q, using this k</p>	<p>1 1</p>
17.8 (b)	$40 = 12.5q$ $q = \frac{40}{12.5} = 3.2$	<p>Substituting $p = 40$ into formula from part a Correct answer</p>	<p>1 1</p>

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17.9	<p>f must be inversely proportional to h^2:</p> $f = \frac{k}{h^2} \Rightarrow 6 = \frac{k}{0.5^2} \Rightarrow k = \frac{3}{2}$ $\Rightarrow f = \frac{3}{2h^2}$	<p>1 mark for describing the proportionality of f and h.</p> <p>1 mark for $f = \frac{k}{h^2}$ or equivalent</p> <p>1 mark for correct value of k</p> <p>1 mark for correct final answer</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
17.10 (a)	<p>$7 \times 2 = 14$ "builder days"</p> <p>4 workers means $14 \div 4 = 3.5$ days</p>	<p>Finding "builder days" or equivalent</p> <p>Correct answer</p>	<p>1</p> <p>1</p>
17.10 (b)	Assumption is that all workers work at the exact same rate		1
17.11	<p>Original density = $\frac{30}{100} = 0.3 \text{ kg/cm}^3$</p> <p>New density = $\frac{70}{140} = 0.5 \text{ kg/cm}^3$</p> <p>% increase = $\frac{0.5 - 0.3}{0.3} \times 100\% = 66.\dot{6}\%$</p> <p>Pat is correct</p>	<p>Finding original and new density</p> <p>Obtaining a % increase</p>	<p>1</p> <p>1</p>

Question	Answer	Extra information	Marks
17.12	$f = k\sqrt{g}$ $2 = k\sqrt{324}$ $k = \frac{1}{9}$ $\Rightarrow f = \frac{\sqrt{g}}{9}$ <p>Now,</p> $g = \frac{K}{h^2}$ $225 = \frac{K}{0.2^2}$ $K = 9$ $\Rightarrow g = \frac{9}{h^2}$ $f^2 = \frac{g}{81} = \frac{1}{81} \left(\frac{9}{h^2} \right) = \frac{1}{9h^2}$ $f = \sqrt{\frac{1}{9h^2}} = \frac{1}{3h}$	$f = k\sqrt{g}$ $g = \frac{K}{h^2}$ <p>Substitutes values of f and g to find k, or values of g and h to find K.</p> <p>k or K correct</p> <p>Correct answer</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

Question	Answer	Extra information	Marks
17.13	$v = \frac{k}{w^2}$ $2 = \frac{k}{9x^2}$ $k = 18x^2$ $\Rightarrow v = \frac{18x^2}{w^2}$ <p>When $w = 5x$:</p> $v = \frac{18x^2}{25x^2} = \frac{18}{25} = 0.72$	$v = \frac{k}{w^2}$ <p>Substituting $v = 2$ and $w = 3x$ correctly Complete method leading to correct answer</p>	<p>1</p> <p>1</p> <p>1</p>
17.14	<p>1.98 km = 1980 m</p> <p>Lower Bound for distance = 1975 m</p> <p>Upper Bound for distance = 1985 m</p> <p>Lower Bound for time = 57.5 s</p> <p>Upper Bound for time = 62.5 s</p> <p>Upper Bound for speed = $\frac{1985}{57.5} = 34.521\dots$</p> <p>Lower Bound for speed = $\frac{1975}{62.5} = 31.6$</p> <p>Both round to 30 m/s to 1 sf</p>	<p>1975 or 57.5</p> <p>1985 or 62.5</p> <p>Correct method for UB of speed of LB of speed</p> <p>34.5217... and 31.6 correct</p> <p>Correct answer with explanation</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

Question	Answer	Extra information	Marks
17.15	<p>Egg without shell = 44.5 g 11% decrease means a multiplier of 0.89 Egg with shell $\times 0.89 = 44.5$ Therefore, egg with shell = $\frac{44.5}{0.89} = 50$ g</p>	<p>Correct multiplier for 11% decrease Sets up correct relationship between shell on and off Correct answer</p>	<p>1 1 1</p>
17.16	<p>The ratio of their money is originally 2 : 1 So, the actual amount of money that each person has can be represented as $2x$ and $1x$, respectively. They each pay £9 for lunch, so they now have $2x - 9$ and $x - 9$ pounds, respectively, and this is in the ratio of 5 : 2. Hence: $\frac{2x - 9}{x - 9} = \frac{5}{2}$ $5x - 45 = 4x - 18$ $x = 27$ That means Ted started with £27, and Fred started with £54</p>	<p>Letting x and $2x$ represent the original amounts Writing $x - 9$ and $2x - 9$ as the current amounts Setting up the ratio equation $\frac{2x - 9}{x - 9} = \frac{5}{2}$ Fully correct</p>	<p>1 1 1 1</p>