

4	$20 + 20 \times r + 20 \times r^2 + \dots \quad \text{or} \quad 20 \times \frac{1-r^n}{1-r}$ $20 \times \frac{1-0.95^n}{1-0.95} = 205$ $0.95^n = \frac{195}{400} \quad \text{or} \quad \frac{39}{80} \quad \text{or} \quad 0.4875$ $n = \frac{\ln 0.4875}{\ln 0.95} \quad \text{oe} \quad \text{or} \quad n = \log_{0.95} \left(\frac{39}{80} \right) \quad \text{oe}$ <p>(Number of steps =) 14</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>[5]</p>	<p>3.1b</p> <p>1.1</p> <p>1.1</p> <p>2.1</p> <p>1.1</p>	<p>Sum of a GP implied. Allow any r, eg $r = 0.05$</p> <p>Correct equation</p> <p>Allow 0.487 or 0.488</p> <p>or $0.95^{14} = 0.4875$ or 0.487 or 0.488 seen. Can be implied by their answer</p> <p>ft their equation of form $a^n = b$ (dep M1 gained and $b > 0$) cao. Allow $n = 14$. Allow 14.0. Allow ≈ 14</p>
	<p>Alternative method Sum of GP implied</p> $20 + 20 \times r + 20 \times r^2 + \dots$ $20 + 20 \times 0.95 + 20 \times 0.95^2 + \dots + 20 \times 0.95^{13}$ $= 205 \text{ (3 sf)}$ <p>Number of steps = 14</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>[5]</p>		<p>Attempt add ≥ 10 terms. Allow any value of r for this mark</p> <p>Correct 14 terms added</p> <p>NB Unsupported correct answer: SC B3</p>
	<p>Alternative (incorrect) methods using</p> <p>$r = 1.05$, or $\frac{1}{0.95}$ or $\frac{20}{19}$</p> $20 + 20 \times r + 20 \times r^2 + \dots \quad \text{or} \quad 20 \times \frac{1-r^n}{1-r}$ $20 \times \frac{1-\left(\frac{1}{0.95}\right)^n}{1-\frac{1}{0.95}} = 205 \quad \text{or} \quad 20 \times \frac{1-\left(\frac{20}{19}\right)^n}{1-\frac{20}{19}} = 205$ $\left(\frac{20}{19}\right)^n = \frac{117}{76} \quad \text{or} \quad 1.05^n = 1.51 \quad \text{or} \quad 1.54$	<p>M1</p> <p>A1</p> <p>A1</p>		<p>(For info' only: $r = \frac{1}{0.95}$ or $\frac{20}{19}$ comes from misinterpreting "lowest" to mean "shortest")</p> <p>Allow any value of r for this mark</p> <p>oe using 1.05. Correct equation</p>

Question		Answer	Mark	AO	Guidance
		$n = \frac{\ln \frac{117}{76}}{\ln \frac{20}{19}}$ or $\ln_{1.053} 1.539$ or $\ln_{1.05} 1.51$ Number of steps = 8 or 9	M1		oe, eg $\frac{\ln 1.539}{\ln 1.053}$ or $\frac{\ln 1.51}{\ln 1.05}$ ft their “ $\frac{117}{76}$ ” Can be implied by their answer
			A0		