| Question | | | Answer | Mark | AO | Guidance |
|---|---|---|---|---|---|---|
| 7 | (a) | | $\frac{dy}{dx} = x\frac{(1+x)^{-\frac{1}{2}}}{2} + \sqrt{1+x}$ | M1 | 1.1 | Attempt to differentiate, e.g. using the product rule to obtain two terms, one of which must include $(1+x)^{-\frac{1}{2}}$ oe |
| | | | | A1 | 1.1 | Correct expression for $\frac{dy}{dx}$, may see e.g. $\frac{dy}{dx} = \frac{x}{2}\frac{1}{\sqrt{1+x}} + \sqrt{1+x}$ |
| | | | $= \frac{x+2(1+x)}{2\sqrt{1+x}}$<br>$= \frac{3x+2}{2\sqrt{x+1}}$ **AG** | A1 | 2.1 | Combining terms to reach AG. Must see an intermediate step. |
| | | | | [3] | | |
| 7 | (b) | | $\frac{3x+2}{2\sqrt{x+1}} > 0$<br>$\Rightarrow 3x+2 > 0$<br>$x > -\frac{2}{3}$ | M1 | 2.1 | Allow $\geq$ throughout. Condone = for **M1A1** only but not < or $\leq$. May be implied by first **A1.** |
| | | | | A1 | 1.1 | |
| | | | | A1 | 1.1 | Condone $x \geq -\frac{2}{3}$ |
| | | | | [3] | | **SCB1** for $x > -\frac{2}{3}$ (max. 1/3) without sufficient working |
| 7 | (c) | | Graph [of gradient function] is above the $x$-axis where $x > -\frac{2}{3}$ | B1 | 2.2a | oe (may be gained following 0 marks in **(b)**)<br>Accept e.g. Graph [of gradient function] is below the $x$-axis where $[-1 <]x < -\frac{2}{3}$. Condone $\geq$ or $\leq$.<br>Allow an equivalent explanation in words (e.g. 'the graph will be above the $x$-axis whenever $x$ is greater than $-\frac{2}{3}$) but must refer to the **range** and not just the intersection i.e. not just 'crosses the $x$-axis at $-\frac{2}{3}$,<br>Condone 'positive' for 'above the $x$-axis (e.g. 'the graph is positive when $x > -\frac{2}{3}$) |
| | | | | [1] | | |