| Question Number | Scheme | Marks |
|---|---|---|
| 2(a) | $F(8)-F(2)$ or $k\times 8^3-k\times 2^3$ | M1 |
| | $k\times 8^3-k\times 2^3=\frac{7}{24}$ | M1 |
| | $504k=\frac{7}{24}\left[\Rightarrow k=\frac{1}{1728}\right]$* | A1* |
| | | (3) |
| (b) | F($b$) = 1 So $\frac{b^3}{1728}=1$ | M1 |
| | $b=12$ | A1 |
| | $f(x)=\left[\frac{d}{dx}F(x)=\right]\frac{1}{576}x^2$ | M1 |
| | $f(x)=\begin{cases}\frac{1}{576}x^2 & 0\leqslant x\leqslant 12\\ 0 & \text{otherwise}\end{cases}$ | A1 |
| | | (4) |
| (c) | [Median =] $\frac{1}{1728}x^3=\frac{1}{2}$ | M1 |
| | $x$ = awrt 9.52 | A1 |
| | | (2) |
| (d) | [Mode = ]12 | B1ft |
| | | (1) |
| (e) | Negative skew as Median < Mode | B1ft |
| | | (1) |

| | Notes | Total 11 |
|---|---|---|
| (a) | **M1** | For writing or using F(8) – F(2) |
| | **M1** | For use $F(8)-F(2)=\frac{7}{24}$ |
| | **A1*** | cso Simplifying to a single term on each side leading to the given answer.<br>Answer is given so there can be no incorrect working seen.<br>$504k=\frac{7}{24}$ leading to $k=\frac{1}{1728}$ **on its own** scores M1M1A0 |
| (b) | **M1** | For use of F($b$) = 1 |
| | **A1** | cao |
| | **M1** | For an attempt at $\frac{d}{dx}F(x)$ $x^3\to x^2$ |
| | **A1** | Fully correct pdf including limits. Allow < instead of $\leqslant$<br>If $b$ = 12 has been found, allow use of $b$ as an upper limit on line 1 |
| (c) | **M1** | For setting the cdf = 0.5 |
| | **A1** | awrt 9.52 Condone $\sqrt[3]{864}$ oe e.g. $2(\sqrt[3]{108})$ |
| (d) | **B1ft** | 12 cao Allow ft on their value of $b$ / their upper limit **provided $b > 8$** |
| (e) | **B1ft** | For a correct (ft) reason **and** description of skewness which must be consistent with **their median** and **their mode**<br>(Allow reference to sketch if shown).<br>Ignore reference to mean if they write e.g. "mean < median < mode"<br>Do not allow comparison of median/mode with mean on its own unless the mean, E($X$) = 9, seen. |