"Understand and use laws of indices for all rational exponents." (Standard)

Question 1

Write down the value of $32^{\frac{1}{5}}$

(1 mark)

Question 2

Express the following in the form 7^k

$\sqrt[4]{7}$

(1 mark)

Question 3

Find the value of $8^{\frac{5}{3}}$.

(2 marks)

Question 4

Express 8^{2x+3} in the form 2^y, stating y in terms of x.

(2 marks)

Question 5

Simplify $\frac{15x^{\frac{4}{3}}}{3x}$

Question 6

Write $\frac{2\sqrt{x}+3}{x}$ in the form $2x^p+3x^q$, where p and q are constants.

Question 7

Simplify fully $\frac{\left(2x^{\frac{1}{2}}\right)^3}{4x^2}$

(3 marks)

Question 8

$f(x) = \frac{(3-4\sqrt{x})^2}{\sqrt{x}}$, $x > 0$

Show that $f(x) = 9x^{-\frac{1}{2}} + Ax^{\frac{1}{2}} + B$, where A and B are constants to be found.

(3 marks)

Mark scheme

Question 1

2

(a) $32^{\frac{1}{5}} = 2$	B1

Question 2

$7^{\frac{1}{4}}$

$\sqrt[4]{7} = 7^{\frac{1}{4}}$	B1

Question 3

32

$8^{\frac{1}{3}} = 2$ or $8^5 = 32768$	A correct attempt to deal with the $\frac{1}{3}$ or the 5. $8^{\frac{1}{3}} = \sqrt[3]{8}$ or $8^5 = 8\times8\times8\times8\times8$	M1
$\left(8^{\frac{5}{3}} =\right)$ 32	Cao	A1

Question 4

$6x + 9$

$(8^{2x+3} = (2^3)^{2x+3}) = 2^{3(2x+3)}$ or 2^{ax+b} with $a = 6$ **or** $b = 9$	M1
$= 2^{6x+9}$ *or* $= 2^{3(2x+3)}$ as **final** answer with no errors or $(y =)6x + 9$ or $3(2x + 3)$	A1

Question 5

$5x^{\frac{1}{3}}$ or $5\sqrt[3]{x}$

Question 6

$2x^{-\frac{1}{2}}+3x^{-1}$

Question 7

$2x^{-\frac{1}{2}}$ or $\frac{2}{\sqrt{x}}$

$\left(2x^{\frac{1}{2}}\right)^3 = 2^3x^{\frac{3}{2}}$	One correct power either 2^3 or $x^{\frac{1}{2}}$. $\left(2x^{\frac{1}{2}}\right)\times\left(2x^{\frac{1}{2}}\right)\times\left(2x^{\frac{1}{2}}\right)$ on its own is not sufficient for this mark.	M1
$\frac{8x^{\frac{3}{2}}}{4x^2} = 2x^{-\frac{1}{2}}$ or $\frac{2}{\sqrt{x}}$	M1: Divides coefficients of x **and** subtracts their powers of x. **Dependent on the previous M1**	dM1A1
	A1: Correct answer	

Question 8

$A = 16, B = -24$

$\left[(3-4\sqrt{x})^2 =\right] 9-12\sqrt{x}-12\sqrt{x}+(-4)^2x$	M1
$9x^{-\frac{1}{2}}+16x^{\frac{1}{2}}-24$	A1, A1 (3)