Chapter review 1 SKILLS EXECUTIVE FUNCTION

1 Simplify:

a $y^3 \times y^5$ **b** $3x^2 \times 2x^5$ **c** $(4x^2)^3 \div 2x^5$ **d** $4b^2 \times 3b^3 \times b^4$

2 Expand and simplify if possible:

a $(x + 3)(x - 5)$ **b** $(2x - 7)(3x + 1)$ **c** $(2x + 5)(3x - y + 2)$

3 Expand and simplify if possible:

a $x(x + 4)(x - 1)$ **b** $(x + 2)(x - 3)(x + 7)$ **c** $(2x + 3)(x - 2)(3x - 1)$

4 Expand the brackets:

a $3(5y + 4)$ **b** $5x^2(3 - 5x + 2x^2)$ **c** $5x(2x + 3) - 2x(1 - 3x)$ **d** $3x^2(1 + 3x) - 2x(3x - 2)$

5 Factorise these expressions completely:

a $3x^2 + 4x$ **b** $4y^2 + 10y$ **c** $x^2 + xy + xy^2$ **d** $8xy^2 + 10x^2y$

6 Factorise:

a $x^2 + 3x + 2$ **b** $3x^2 + 6x$ **c** $x^2 - 2x - 35$ **d** $2x^2 - x - 3$
e $5x^2 - 13x - 6$ **f** $6 - 5x - x^2$

7 Factorise:

a $2x^3 + 6x$ **b** $x^3 - 36x$ **c** $2x^3 + 7x^2 - 15x$

8 Simplify:

a $9x^3 \div 3x^{-3}$ **b** $(4^{\frac{3}{2}})^{\frac{1}{3}}$ **c** $3x^{-2} \times 2x^4$ **d** $3x^{\frac{1}{3}} \div 6x^{\frac{2}{3}}$

9 Evaluate, without using your calculator:

a $\left(\frac{8}{27}\right)^{\frac{2}{3}}$ **b** $\left(\frac{225}{289}\right)^{\frac{3}{2}}$

10 Simplify, without using your calculator:

a $\frac{3}{\sqrt{63}}$ **b** $\sqrt{20} + 2\sqrt{45} - \sqrt{80}$

11 **a** Find the value of $35x^2 + 2x - 48$ when $x = 25$.

b By factorising the expression, show that your answer to part **a** can be written as the product of two **prime** factors.

12 Expand and simplify if possible, without using your calculator:

a $\sqrt{2}(3 + \sqrt{5})$ **b** $(2 - \sqrt{5})(5 + \sqrt{3})$ **c** $(6 - \sqrt{2})(4 - \sqrt{7})$

13 Rationalise the denominator and simplify:

a $\dfrac{1}{\sqrt{3}}$ **b** $\dfrac{1}{\sqrt{2}-1}$ **c** $\dfrac{3}{\sqrt{3}-2}$ **d** $\dfrac{\sqrt{23}-\sqrt{37}}{\sqrt{23}+\sqrt{37}}$ **e** $\dfrac{1}{(2+\sqrt{3})^2}$ **f** $\dfrac{1}{(4-\sqrt{7})^2}$

14 **Do not use your calculator for this question.**

a Given that $x^3 - x^2 - 17x - 15 = (x + 3)(x^2 + bx + c)$, where b and c are constants, work out the values of b and c.

b **Hence**, fully factorise $x^3 - x^2 - 17x - 15$.

(E) **15** Given that $y = \frac{1}{64}x^3$, express each of the following in the form kx^n, where k and n are constants.

a $y^{\frac{1}{3}}$ **(1 mark)**

b $4y^{-1}$ **(1 mark)**

(E/P) **16** Show that $\dfrac{5}{\sqrt{75}-\sqrt{50}}$ can be written in the form $\sqrt{a}+\sqrt{b}$, where a and b are integers. **(5 marks)**

(E) **17** Expand and simplify $(\sqrt{11}-5)(5-\sqrt{11})$, without using your calculator. **(2 marks)**

(E) **18** Factorise completely $x - 64x^3$. **(3 marks)**

(E/P) **19** Express 27^{2x+1} in the form 3^y, stating y in terms of x. **(2 marks)**

(E/P) **20** Solve the equation $8 + x\sqrt{12} = \dfrac{8x}{\sqrt{3}}$.

Give your answer in the form $a\sqrt{b}$, where a and b are integers. **(4 marks)**

(P) **21** **Do not use your calculator for this question.**

A rectangle has a length of $(1+\sqrt{3})$ cm and area of $\sqrt{12}$ cm^2.

Calculate the width of the rectangle in cm.

Express your answer in the form $a + b\sqrt{3}$, where a and b are integers to be found.

(E) **22** Show that $\dfrac{(2-\sqrt{x})^2}{\sqrt{x}}$ can be written as $4x^{-\frac{1}{2}} - 4 + x^{\frac{1}{2}}$. **(2 marks)**

(E/P) **23** Given that $243\sqrt{3} = 3^a$, find the value of a. **(3 marks)**

(E/P) **24** Given that $\dfrac{4x^3 + x^{\frac{5}{2}}}{\sqrt{x}}$ can be written in the form $4x^a + x^b$,

write down the value of a and the value of b. **(2 marks)**

Challenge

a Simplify $(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})$.

b Hence show that $\dfrac{1}{\sqrt{1}+\sqrt{2}} + \dfrac{1}{\sqrt{2}+\sqrt{3}} + \dfrac{1}{\sqrt{3}+\sqrt{4}} + \ldots + \dfrac{1}{\sqrt{24}+\sqrt{25}} = 4$