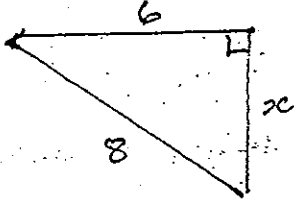


QUESTION 1.

a) Find the ^{exact} value of the pronumeral



b) Between which two consecutive whole numbers does $\sqrt{41}$ lie?

c) evaluate $\sqrt{16^2 + 12^2}$

d) simplify $(5\sqrt{3})^3$

e) square $3\sqrt{2}$

simplify
f) $2\sqrt{5} + 3\sqrt{5} - 6\sqrt{5}$

g) $\sqrt{4x} + \sqrt{9y} - \sqrt{x}$

h) $\frac{\sqrt{84}}{\sqrt{14}}$

Expand

i) $\sqrt{2}(2\sqrt{2} - 3\sqrt{5})$

j) $(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})$

QUESTION 2

Simplify

a) $\frac{6\sqrt{3} \times 4\sqrt{18}}{2\sqrt{12}}$

b) $2\sqrt{27} - \sqrt{75} + 2\sqrt{12}$

c) Expand and simplify
i) $(2\sqrt{3} - 7)(2\sqrt{3} + 3)$

ii) $3 - (1 + \sqrt{2})^2$

QUESTION 3

Rationalise the denominator and simplify:

a) $\frac{2}{\sqrt{14}}$

b) $\frac{3}{\sqrt{12}}$

c) $\frac{6}{\sqrt{5} - \sqrt{2}}$

d) $\frac{2\sqrt{5}}{2\sqrt{5} + 5}$

28

e) $\frac{3}{\sqrt{5} + 2} \times \frac{2}{\sqrt{5} + 1}$

QUESTION 4

a) simplify 5^5

b) Evaluate $16^{\frac{3}{4}}$

c) solve $2^x = 64$

d) solve $4\sqrt{2} = \sqrt{x}$

e) simplify $9^3 \times 3^4$
leave as index notation

f) $2x^5 \times 3x^3$

g) $5x^0 + (3y)^0$

h) $(a^9 b^4)^{\frac{1}{2}}$

i) $5^{a-1} \times 5^{a+2}$

j) $6x^2 \div 3x^{-1}$

QUESTION 5

Simplify

a) $5x^3y \times 9x^2y$

b) $\frac{6x^3y^2}{5x^5} \div \frac{9x^7}{10y^2}$

c) $(3p^2)^3 \div (9p^5)^2$

d) expand $3a^4b(3ab - 2b^4)$

QUESTION 6

a) Rationalise each denominator then express as a single fraction.

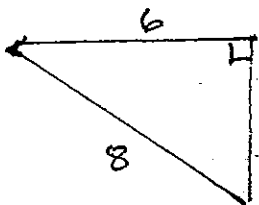
$\frac{2}{\sqrt{2}} + \frac{3}{3-\sqrt{2}}$

b) Express as a single fraction

$xy^{-1} + x^{-1}y$

QUESTION 1.

a) Find the ^{exact} value of the pronumeral



$$x^2 = 8^2 - 6^2$$

$$= 64 - 36$$

$$x = \sqrt{28}$$

$$x = \sqrt{28}$$

b) Between which two consecutive whole numbers does $\sqrt{41}$ lie?

$$\sqrt{36}, \sqrt{49}$$

$$6, 7$$

c) evaluate $\sqrt{16^2 + 12^2}$

$$= \sqrt{400}$$

$$= 20$$

d) simplify $(5\sqrt{3})^3$

$$125 \sqrt{27}$$

$$= 375\sqrt{3}$$

e) square $3\sqrt{2}$

$$(3\sqrt{2})^2 = 9 \times 2$$

$$= 18$$

simplify

f) $2\sqrt{5} + 3\sqrt{15} - 6\sqrt{5}$

$$3\sqrt{15} - 4\sqrt{5}$$

g) $\sqrt{4x} + \sqrt{9y} - \sqrt{7z}$

$$2\sqrt{x} + 3\sqrt{y} - \sqrt{z}$$

$$\sqrt{x} + 3\sqrt{y}$$

h) $\frac{\sqrt{84}}{\sqrt{14}}$

$$\sqrt{6}$$

$$= \sqrt{6}$$

Expand

i) $\sqrt{2}(2\sqrt{2} - 3\sqrt{5})$

$$4 - 3\sqrt{10}$$

ii) $(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})$

$$(\sqrt{5})^2 - (\sqrt{2})^2$$

$$= 5 - 2$$

$$= 3$$

QUESTION 2

Simplify

a) $\frac{6\sqrt{3} \times 4\sqrt{18}}{2\sqrt{12}}$

$$\frac{6\sqrt{3} \times 12\sqrt{2}}{2\sqrt{3} \times \sqrt{3}}$$

$$= 18\sqrt{2}$$

b) $2\sqrt{27} - \sqrt{75} + 2\sqrt{12}$

$$= 6\sqrt{3} - 5\sqrt{3} + 4\sqrt{3}$$

$$= 5\sqrt{3}$$

$$2\sqrt{9 \times 3} - \sqrt{25 \times 3} + 2\sqrt{3 \times 4}$$

$$= 6\sqrt{3} - 5\sqrt{3} + 4\sqrt{3} = 5\sqrt{3}$$

c) Expand and simplify

i) $(2\sqrt{3} - 7)(2\sqrt{3} + 3)$

$$(2\sqrt{3} \times 2\sqrt{3}) + 6\sqrt{3} - 14\sqrt{3} - 21$$

$$= 12 + 6\sqrt{3} - 14\sqrt{3} - 21$$

$$= -9 - 8\sqrt{3}$$

ii) $3 - (1 + \sqrt{2})^2$

$$3 - (1 + 2\sqrt{2} + 2)$$

$$= 3 - (3 + 2\sqrt{2})$$

$$= -2\sqrt{2}$$

QUESTION 3

Rationalise the denominator and simplify:

a) $\frac{2}{\sqrt{14}} \times \frac{\sqrt{14}}{\sqrt{14}} = \frac{2\sqrt{14}}{14}$

$$= \frac{\sqrt{14}}{7}$$

b) $\frac{3}{\sqrt{12}} \times \frac{\sqrt{12}}{\sqrt{12}} = \frac{3\sqrt{12}}{12}$

$$= \frac{\sqrt{3}}{4}$$

c) $\frac{6}{\sqrt{5} - \sqrt{2}} \times \frac{\sqrt{5} + \sqrt{2}}{\sqrt{5} + \sqrt{2}} = \frac{6\sqrt{5} + 6\sqrt{2}}{5 - 2}$

$$= \frac{6(2\sqrt{5} + 2\sqrt{2})}{3}$$

$$= 2(2\sqrt{5} + 2\sqrt{2})$$

d) $\frac{2\sqrt{5}}{2\sqrt{5} + 5} \times \frac{2\sqrt{5} - 5}{2\sqrt{5} - 5} = \frac{20 - 10\sqrt{5}}{20 - 25}$

$$= \frac{20 - 10\sqrt{5}}{-5}$$

$$= -(4 - 2\sqrt{5})$$

$$= 2\sqrt{5} - 4$$

28

e) $\frac{3}{\sqrt{5} + 2} \times \frac{2}{\sqrt{5} + 1}$

$$= \frac{6}{(\sqrt{5} + 2)(\sqrt{5} + 1)}$$

$$= \frac{6}{5 + 3\sqrt{5} + 2}$$

$$= \frac{6}{7 + 3\sqrt{5}}$$

$$\times \frac{7 - 3\sqrt{5}}{7 - 3\sqrt{5}}$$

$$= \frac{42 - 18\sqrt{5}}{49 - 45}$$

$$= \frac{21 - 9\sqrt{5}}{4}$$

QUESTION 4

a) Simplify 5^5

3125

b) Evaluate $16^{\frac{3}{4}}$

$8 \checkmark$

c) solve $2^x = 64$
 $2^x = 2^6$

$x = 6 \checkmark$

d) solve $4\sqrt{2} = \sqrt{x}$
 $(4\sqrt{2})^2 = (\sqrt{x})^2$
 $16 \times 2 = x$

$x = 32 \checkmark$

e) simplify $9^3 \times 3^4 \times 9^3 \times 9^2 = 9^5 \checkmark$
 leave as index notation

f) $2x^5 \times 3x^3$

$6x^8 \checkmark$

g) $5x^0 + (3y)^0$
 $(1 \times 5) + 1 = 5 + 1$

$= 6 \checkmark$

h) $(a^9 b^4)^{\frac{1}{2}}$

$a^{\frac{9}{2}} b^2$
 $a^3 \sqrt{a^3} = a^{\frac{9}{2}} b^2$

$a^{\frac{9}{2}} b^2$
 easy wrap

i) $5^{a-1} \times 5^{a+2}$
 $a-1 + a+2 = 2a+1$

$5^{2a+1} \checkmark$

j) $6x^2 \div 3x$
 $\frac{6x^2}{3x} = 2x$

$2x^3 \checkmark$

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QUESTION 5

Simplify

a) $5x^3y \times 9x^2y$
 $= 45x^5y^2$

1

20

b) $\frac{6x^3y^2}{5x^5} \div \frac{9x^7}{10y^2}$
 $\frac{6x^3y^2}{5x^5} \times \frac{2 \cdot 10y^2}{3 \cdot 9x^7} = \frac{2 \cdot 4y^4}{3x^4} = \frac{4y^4}{3x^4}$

c) $(3p^2)^3 \div (9p^5)^2$
 $\frac{27p^6}{81p^{10}} = \frac{1}{3p^4}$

d) expand $3a^4b(3ab - 2b^4)$
 $= 9a^5b^2 - 6a^4b^5$

QUESTION 6

a) Rationalise each denominator then express as a single fraction.

$\frac{2}{\sqrt{2}} + \frac{3}{3-\sqrt{2}}$
 $\frac{2}{\sqrt{2}} = \sqrt{2}$
 $\frac{3}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{3(3+\sqrt{2})}{3^2 - (\sqrt{2})^2} = \frac{9+3\sqrt{2}}{7}$

$\frac{\sqrt{2}}{1} + \frac{9+3\sqrt{2}}{7}$

$= \frac{7\sqrt{2} + 9 + 3\sqrt{2}}{7}$

$= \frac{10\sqrt{2} + 9}{7}$

b) Express as a single fraction

$xy^{-1} + x^{-1}y$

$\frac{x}{y} + \frac{y}{x} = \frac{x^2 + y^2}{xy}$

$= \frac{x^2 + y^2}{xy}$