Basic arithmetic and algebra

Solutions Main Menu

1 What is the value of $\dfrac{2.4+3.6}{11.5+2.1}$ correct to two decimal places?

(A) 0.44
(B) 2.62
(C) 2.66
(D) 4.81

2 What is the value of $\dfrac{169.8}{14.2\times 5.8}$ correct to two significant figures?

(A) 2.0
(B) 2.1
(C) 2.06
(D) 2.07

3 What is the value of $\dfrac{(1.49)^2-1.98}{\sqrt{11.62+8.34\times 2.72}}$ correct to three significant figures?

(A) 0.040
(B) 0.041
(C) 0.0409
(D) 0.0410

4 Which of the following is equivalent to $\sqrt{3}+\sqrt{27}-\sqrt{18}$?

(A) $\sqrt{3}$
(B) $\sqrt{12}$
(C) $4\sqrt{3}-3\sqrt{2}$
(D) $10\sqrt{3}-9\sqrt{2}$

5 What is $\dfrac{2}{2+\sqrt{3}}$ as a fraction with a rational denominator?

(A) $\dfrac{4-2\sqrt{3}}{7}$
(B) $\dfrac{4+2\sqrt{3}}{7}$
(C) $4-2\sqrt{3}$
(D) $4+2\sqrt{3}$

6 What is $\dfrac{1+\sqrt{3}}{5-2\sqrt{3}}$ as a fraction with a rational denominator?

(A) $\dfrac{-5-\sqrt{3}}{7}$
(C) $\dfrac{-5+\sqrt{3}}{13}$
(B) $\dfrac{11-7\sqrt{3}}{7}$
(D) $\dfrac{11+7\sqrt{3}}{13}$

7 What is a correct set of values for a, b and c, given $c=\sqrt{a^2-b^2}$?

(A) $a=16,\ b=30, c=34$
(B) $a=34,\ b=30, c=16$
(C) $a=16,\ b=34, c=30$
(D) $a=30,\ b=16, c=34$

8 If $a=2b^3-1$, what is the value of b when a is 13?

(A) $\sqrt[3]{6}$
(B) $\sqrt[3]{7}$
(C) $\sqrt[3]{14}$
(D) $\dfrac{\sqrt[3]{14}}{2}$

9 Expand and simplify $4(x-1)-x+1$

(A) $3x$
(B) $3x-5$
(C) $3x-3$
(D) $3x+5$

10 $12a^6\div 4a^3=$

(A) $3a^2$
(B) $3a^3$
(C) $8a^2$
(D) $8a^3$

11 Which statement is *not* true?

(A) $x^8 \div x^2 = x^4$

(B) $x^8 \times x^2 = x^{10}$

(C) $(x^8)^2 = (x^2)^8$

(D) $x^0 = 1$

12 Simplify $\dfrac{5m^2 \times 4m^6}{10m^3}$.

(A) $\dfrac{m^4}{2}$

(B) $\dfrac{m^5}{2}$

(C) $2m^4$

(D) $2m^5$

13 Simplify $\dfrac{4a^2 - ab}{16a^2 - b^2}$.

(A) $\dfrac{a}{(4a-b)}$

(B) $\dfrac{4a-b}{(16a+b)}$

(C) $\dfrac{4a-b}{(16a-b)}$

(D) $\dfrac{a}{(4a+b)}$

14 Simplify $\dfrac{x^3-1}{x^2-1} \times \dfrac{x^2-4x-5}{4x^2+4x+4}$

(A) $\dfrac{(x-5)}{4}$

(B) $\dfrac{(x-1)}{4}$

(C) $\dfrac{(x+1)}{4}$

(D) $\dfrac{(x^2+x+1)}{4}$

15 Which expression is equivalent to $3a^2(a+2) - a^2$?

(A) $3a^3 - a^2 + 2$

(B) $3a^3 + 5a^2$

(C) $a^3 + 5a^2$

(D) $6a^3 - a^2$

16 Factorise $3x^2 + 9x$.

(A) $3x(x+3)$

(B) $3x(x+9)$

(C) $3x(x+12)$

(D) $3x(3x+3)$

17 Factorise $3x^2 + 15x - 72$.

(A) $(x-8)(x+3)$

(B) $(x+8)(x-3)$

(C) $3(x-8)(x+3)$

(D) $3(x+8)(x-3)$

18 $\dfrac{1}{4} + \dfrac{x}{8} = ?$

(A) $\dfrac{1+x}{8}$

(B) $\dfrac{2+x}{8}$

(C) $\dfrac{1+x}{12}$

(D) $\dfrac{8+x}{32}$

19 The formula $H = 5m(Y - X)$ is used to calculate the heat (H) required to raise the temperature of a steel rod, of mass m, from a temperature of X to a temperature of Y. Rearrange the formula to make X the subject.

(A) $X = \dfrac{5m - H}{Y}$

(B) $X = \dfrac{H - 5m}{Y}$

(C) $X = \dfrac{H - 5mY}{5m}$

(D) $X = \dfrac{5mY - H}{5m}$

20 What is the solution to the equation $9x-8=27$?

(A) $x=\frac{9}{35}$ (B) $x=\frac{7}{3}$

(C) $x=1\frac{8}{9}$ (D) $x=3\frac{8}{9}$

21 What is the solution to the equation $5a-2=a+6$?

(A) $a=1$ (B) $a=1\frac{2}{3}$

(C) $a=2$ (D) $a=4$

22 What is the solution to the equation $\frac{7x-3}{2}=4$?

(A) $x=\frac{7}{11}$ (B) $x=\frac{5}{7}$

(C) $x=1\frac{2}{7}$ (D) $x=1\frac{4}{7}$

23 What is the solution to the equation $\frac{x+4}{3}=\frac{x}{2}-2$?

(A) $x=2$ (B) $x=5$

(C) $x=6$ (D) $x=20$

24 What is the solution to the equation $8(a-1)=4(a+8)$?

(A) $a=0.\dot{4}$ (B) $a=2.25$

(C) $a=6$ (D) $a=10$

25 What is the solution to the equation $4\sqrt{m}-9=0$?

(A) $m=\frac{18}{8}$ (B) $m=\frac{81}{16}$

(C) $m=\frac{3}{2}$ (D) $m=6$

26 What is the solution to the equation $4^x-9(2^x)+8=0$?

(A) $x=1$ and $x=3$

(B) $x=1$ and $x=4$

(C) $x=0$ and $x=3$

(D) $x=0$ and $x=4$

27 What is the simultaneous solution to the equations $x+y=1$ and $3x-y=7$?

(A) $x=2$ and $y=-1$

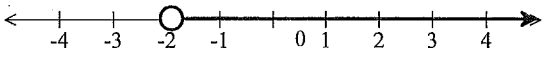
(B) $x=3$ and $y=-2$

(C) $x=2$ and $y=3$

(D) $x=3$ and $y=4$

28 Which of the following graphs represents the solution of $-4x<8$?

(A)



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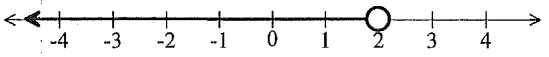

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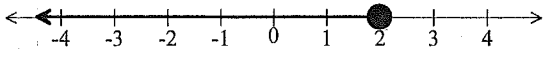

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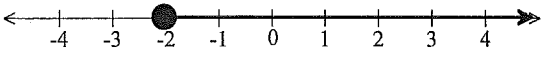


29 What is the solution to the inequality $|2-5x|<7$?

(A) $x<-1$ or $x<\frac{9}{5}$

(B) $x>-1$ or $x>\frac{9}{5}$

(C) $x>-1$ or $x<\frac{9}{5}$

(D) $x<-1$ or $x>\frac{9}{5}$

30 What is the solution to the inequality $|2x+1|\leq 3$?

(A) $x\geq 1$ or $x\geq -2$

(B) $x\geq 1$or $x\geq 2$

(C) $x\leq 1$ or $x\geq -2$

(D) $x\leq 1$ or $x\geq 2$

Objective Response Bank

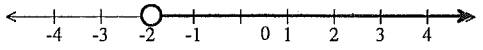
Year 11 Mathematics

Worked solutions

Basic arithmetic and algebra		Main Menu
	Solution	**Criteria**
1	$\frac{2.4+3.6}{11.5+2.1}=0.441176471$ $=0.44$ (2 decimal places)	1 Mark: A
2	$\frac{169.8}{14.2\times5.8}=2.061680427...$ ≈ 2.1 (2 signficant figures)	1 Mark: B
3	$\frac{(1.49)^2-1.98}{\sqrt{11.62+8.34\times2.72}}=0.040993...$ ≈ 0.0410 (3 signficant figures)	1 Mark: D
4	$\sqrt{3}+\sqrt{27}-\sqrt{18}=\sqrt{3}+3\sqrt{3}-3\sqrt{2}$ $=4\sqrt{3}-3\sqrt{2}$	1 Mark: C
5	$\frac{2}{2+\sqrt{3}}=\frac{2}{2+\sqrt{3}}\times\frac{2-\sqrt{3}}{2-\sqrt{3}}$ $=\frac{4-2\sqrt{3}}{4-3}$ $=4-2\sqrt{3}$	1 Mark: C
6	$\frac{1+\sqrt{3}}{5-2\sqrt{3}}=\frac{1+\sqrt{3}}{5-2\sqrt{3}}\times\frac{5+2\sqrt{3}}{5+2\sqrt{3}}$ $=\frac{5+2\sqrt{3}+5\sqrt{3}+6}{25-12}$ $=\frac{11+7\sqrt{3}}{13}$	1 Mark: D
7	$c=\sqrt{a^2-b^2}$ $16=\sqrt{34^2-30^2}$	1 Mark: B
8	$13=2b^3-1$ $2b^3=14$ $b=\sqrt[3]{7}$	1 Mark: B
9	$4(x-1)-x+1=4x-4-x+1$ $=3x-3$	1 Mark: C

10	$12a^6\div4a^3=3a^3$	1 Mark: B
11	$x^8\div x^2=x^6$ (not x^4)	1 Mark: A
12	$\frac{5m^2\times4m^6}{10m^3}=\frac{20m^8}{10m^3}$ $=2m^5$	1 Mark: D
13	$\frac{4a^2-ab}{16a^2-b^2}=\frac{a(4a-b)}{(4a-b)(4a+b)}$ $=\frac{a}{(4a+b)}$	1 Mark: D
14	$\frac{x^3-1}{x^2-1}\times\frac{x^2-4x-5}{4x^2+4x+4}=\frac{(x-1)(x^2+x+1)}{(x-1)(x+1)}\times\frac{(x+1)(x-5)}{4(x^2+x+1)}$ $=\frac{(x-5)}{4}$	1 Mark: A
15	$3a^2(a+2)-a^2=3a^3+6a^2-a^2$ $=3a^3+5a^2$	1 Mark: B
16	$3x^2+9x=3x(x+3)$	1 Mark: A
17	$3x^2+15x-72=3(x^2+5x-24)$ $=3(x+8)(x-3)$	1 Mark: D
18	$\frac{1}{4}+\frac{x}{8}=\frac{2}{8}+\frac{x}{8}=\frac{2+x}{8}$	1 Mark: B
19	$H=5m(Y-X)$ $\frac{H}{5m}=Y-X$ $X=Y-\frac{H}{5m}=\frac{5mY-H}{5m}$	1 Mark: D
20	$9x-8=27$ $9x=35$ $x=\frac{35}{9}=3\frac{8}{9}$	1 Mark: D
21	$5a-2=a+6$ $5a=a+8$ $4a=8$ $a=2$	1 Mark: C

22	$\frac{7x-3}{2}=4$ $7x-3=8$ $7x=11$ $x=\frac{11}{7}=1\frac{4}{7}$	1 Mark: D
23	$\frac{x+4}{3}=\frac{x}{2}-2$ $6\times\left(\frac{x+4}{3}\right)=\left(\frac{x}{2}\right)\times 6-2\times 6$ $2x+8=3x-12$ $x=20$	1 Mark: D
24	$8(a-1)=4(a+8)$ $8a-8=4a+32$ $4a=40$ $a=10$	1 Mark: D
25	$4\sqrt{m}-9=0$ $\sqrt{m}=\frac{9}{4}$ $m=\frac{9^2}{4}$ $=\frac{81}{16}$	1 Mark: B
26	Let $m=2^x$ then $m^2-9m+8=0$ $(m-8)(m-1)=0$ $m=8 \quad m=1$ $2^x=8 \quad 2^x=1$ $x=3 \quad x=0$	1 Mark: C
27	$x+y=1 \quad (1)$ $3x-y=7 \quad (2)$ Eqn (1)+(2) $4x=8$ $x=2$ Substitute $x=2$ into eqn (1) $2+y=1$ $y=-1$ Solution is $x=2$ and $y=-1$.	1 Mark: A

28	$-4x<8$ $x>-2$  	1 Mark: A
29	$\lvert 2-5x\rvert<7$ $2-5x<7$ and $-2+5x<7$ $-5x<5$ $5x<9$ $x>-1$ $x<\frac{9}{5}$	1 Mark: C
30	$\lvert 2x+1\rvert\le 3$ $2x+1\le 3$ and $2x+1\ge -3$ $2x\le 2$ $2x\ge -4$ $x\le 1$ $x\ge -2$	1 Mark: C