Name: _____

TOPIC TEST

Formulas and equations

- Time allowed: 45 minutes
- Part A: 20 multiple-choice questions (20 marks)
- Part B: 9 free-response questions (30 marks)

Part A

20 multiple-choice questions
1 mark each: 20 marks
Circle the correct answer

1 Simplify $(-7p)^2 + 5 + p^2 - 8$

A $-48p^2 - 3$

B $-50p^2 - 3$

C $50p^2 - 3$

D $-50p^2 + 3$

2 Expand and simplify $5 - 4(2m - 8)$.

A $2m - 8$

B $-27 - 8m$

C $17 - 8m$

D $37 - 8m$

3 Fried's rule for determining medicine dosage for a child under 2 years is given by:

$$\text{dosage} = \frac{\text{age in months}}{150} \times \text{adult dosage}$$

Calculate the dosage to be given to a child on 1 February 2018 if the child was born on 30 November 2016 and the adult dosage is 200 g.

A 18.5 g

B 18.7 g

C 17.3 g

D 20 g

4 Simplify $-6 + 8p - 9 - p$.

A $3 + 9p$

B $7p - 15$

C $8p - 15$

D $3 - 9p$

5 Simplify $\frac{5m}{7} \times \left(-\frac{2}{15mn}\right)$.

A $-\frac{2}{21n}$

B $-\frac{n}{21}$

C $-\frac{4}{42n}$

D $-\frac{2}{21m^2n}$

6 Expand $2p(p + 8 - p^4)$.

A $2p^2 + 10p - 2p^4$

B $2p^2 + 16p - 2p^4$

C $2p^2 + 16p - 2p^5$

D $2p^2 + 10p - 2p^5$

7 The formula for converting a speed of p m/s to M km/h is $M = \frac{18p}{5}$. Convert a speed of 32 m/s to km/h.

A 116 km/h

B 108 km/h

C 120 km/h

D 115.2 km/h

8 $S = 2\pi r(r + h)$ is the formula for the surface area of a cylinder with radius r and height h. What is the surface area of a cylinder with radius 5.5 cm and height 12 cm?

A 604.76 cm^2

B 604.75 cm^2

C 604.76 m^2

D 186.23 cm^2

9 Simplify $\frac{7p}{12t} \div \frac{14p}{42t}$.

A $\frac{4}{7}$

B $\frac{7}{4}$

C $\frac{7p^2}{36t^2}$

D $\frac{7t^2}{4p^2}$

10 $V = \left(\sqrt{\frac{A}{6}}\right)^3$ is the formula for the volume of a cube with surface area A. What is the volume of a cube whose surface area is 8.64 m^2?

A 1.176 m^3

B 2.27 m^3

C 3.6 m^3

D 1.728 m^3

11 $P = a + b + \sqrt{(a+b)^2 - 2ab}$. Evaluate P when $a = 1.5$ and $b = 2$.

A 1

B 6.5

C 6

D 5.5

12 Solve the equation $3p - 8 = 14 + p$.

A $p = 11$

B $p = 22$

C $p = 3$

D $p = 6$

13 In which line was an error made in solving the following equation? **A**, **B** or **C**?

Line 1: $\frac{x-2}{5} + 9 = 6$

A Line 2: $\frac{x-2}{5} = -3$

B Line 3: $x - 2 = -15$

C Line 4: $x = -17$

14 Solve $5(2 - 4t) = 2t - 8$.

A $t = -\frac{1}{11}$

B $t = -\frac{1}{9}$

C $t = \frac{9}{11}$

D $t = -\frac{9}{11}$

15 Solve $8 - \frac{n}{2} = -1$.

A $n = -18$

B $n = 18$

C $n = 14$

D $n = -14$

16 The number (N) of apples left on trees in an orchard after t minutes of apple-picking is given by $N = 612 - 6t$. How many apples will be left on the trees after half an hour?

A 180 **B** 609

C 432 **D** 80

17 Simplify $\frac{4cd}{9f} \times \frac{18f}{8d}$.

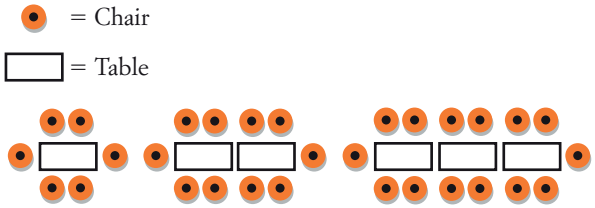
A $\frac{1}{c}$

B $\frac{2}{c}$

C $2c$

D c

18 The number of chairs C that can be placed around t rectangular tables is given by $C = 4t + 2$. How many tables are required to seat 66 people?



A 16 **B** 17

C 15 **D** 14

19 Roasting time, T min, for meat of weight M kg is given by the formula $T = 25M + 20$. What weight of meat will take 1 hour and 20 minutes to roast?

A 2.4 kg

B 2.02 kg

C 4 kg

D 2.2 kg

20 $T = a + \frac{2b}{3}$. Make b the subject of the formula.

A $b = \frac{2(T-a)}{3}$

B $b = \frac{3(T-a)}{2}$

C $b = \frac{3(a-T)}{2}$

D $b = \frac{3T-a}{2}$

Part B

9 free-response questions
30 marks
Show your working where appropriate.

21 Solve the equation $13 = 4 + 0.6(P - 8)$

[3 marks]

22 Solve each equation.

a $25 = P\,(1.08)^9$

Express your answer to 2 decimal places.

b $7(3h - 2) = -1 - 5h$

[4 marks]

23 Clark's rule for calculating medicine dosage for children 2 years and over is:

$$\text{Child dosage} = \frac{\text{weight in kg}}{70} \times \text{adult dosage}$$

Sienna is 14 years old and takes 1155 mg of a drug with a recommended adult dose of 1470 mg each day. Use Clark's rule to calculate Sienna's weight.

[3 marks]

24 Simplify each expression.

a $5x^2 + 6x + 3x^2 + 2x$

b $3pq + 2p - qp - 8p$

c $m^3 - m - 4m + 2$

d $\frac{c^2 d}{4} \times 20cd$

e $\frac{5e^2}{30} \times 3e$

f $m \div 5m$

g $\frac{40p^3q}{12pq^2}$

[7 marks]

25 Expand each expression.

a $-5(2k - 3)$

b $3y(2x + 5y)$

c $-2m(1 + m)$

[3 marks]

26 If $a = -4$, $b = 8$ and $c = 3$, evaluate:

a $b^2 - a^2$

b $\sqrt{\dfrac{16b}{3a + 14}}$

c $6a + 3c + 15$

[3 marks]

27 Expand and simplify $2(3x - 2) - 6(2x + 3)$.

[2 marks]

28 If $x = 5$, $y = 8$ and $z = -2$, evaluate $\sqrt{5y - 2x - 3z}$.

[1 mark]

29 Change the subject of the formula to the pronumeral in brackets.

a $P = \dfrac{8N - 3H}{2L}$ $[N]$

b $M = \dfrac{3}{5}\pi r^2$ $[r]$

[4 marks]

This is the end of the test.

Answers

Part A

1	C	**2**	D	**3**	B	**4**	B
5	A	**6**	C	**7**	D	**8**	A
9	B	**10**	D	**11**	C	**12**	A
13	C	**14**	C	**15**	B	**16**	C
17	D	**18**	A	**19**	A	**20**	B

Part B

21 23

22 **a** 12.51

b 0.5

23 55 kg

24 **a** $8x^2 + 8x$

b $2pq - 6p$

c $m^3 - 5m + 2$

d $5c^3d^2$

e $\frac{e^3}{2}$

f $\frac{1}{5}$

g $\frac{10p^2}{3q}$

25 **a** $-10k + 15$

b $6xy + 15y^2$

c $-2m - 2m^2$

26 **a** 48

b 8

c 0

27 $-6x - 22$

28 6

29 **a** $N = \frac{2LP + 3H}{8}$

b $r = \sqrt{\frac{5M}{3\pi}}$