Final Examination 2021 – 2022
Mathematics Compulsory Part
Paper 2

Form Six

Name: _____
Class: _____( )

- **Time allowed : 1 hour and 15 minutes**
- **Answer ALL questions. All the answers must be marked on the MC answer sheet with pencil or marks will be deducted.**
- **The diagrams are not necessarily drawn to scale.**

Section A

1. $\frac{(3^n)(4^n)}{6^{2n}} =$

   A. 1 .
   B. $\frac{1}{3^n}$.
   C. $\frac{1}{2^n}$.
   D. 2^n .

2. $(a+b)^2(a-b) =$

   A. $a^3 - a^2b - ab^2 - b^3$.
   B. $a^3 - a^2b + ab^2 - b^3$.
   C. $a^3 + a^2b - ab^2 - b^3$.
   D. $a^3 + a^2b + ab^2 - b^3$.

3. If $\frac{h}{h-k} = \frac{2}{2h+k}$, then $k =$

   A. $\frac{2h(1-h)}{h+2}$.
   B. $\frac{2h(h-1)}{h+2}$.
   C. $\frac{2h(1+h)}{h-2}$.
   D. $\frac{2h(1+h)}{2-h}$.

4. If $0.054546 < x < 0.054553$, which of the following is true?

   A. x = 0.0545 (correct to 3 decimal places)
   B. x = 0.0545 (correct to 3 significant figures)
   C. x = 0.05455 (correct to 4 decimal places)
   D. x = 0.05455 (correct to 4 significant figures)

5. $\frac{9}{d-3} - \frac{8}{d+4} =$

   A. $\frac{d-12}{(d-3)(d+4)}$.
   B. $\frac{d+1}{(d-3)(d+4)}$.
   C. $\frac{d+12}{(d-3)(d+4)}$.
   D. $\frac{d+60}{(d-3)(d+4)}$.

6. If a and b are constants such that $(2x-a)^2 + 4 \equiv 4(x-2)(x-1) + b$, then $b =$

   A. –11 .
   B. –5 .
   C. 5 .
   D. 11 .

7. Let $g(x) = 4x^2 - 2x - 1$. If $g(3a) = 10a$, find a.

   A. $a = -\frac{1}{2}$ or $\frac{1}{18}$
   B. $a = -\frac{1}{3}$ or $\frac{1}{12}$
   C. $a = -\frac{1}{12}$ or $\frac{1}{3}$
   D. $a = -\frac{1}{18}$ or $\frac{1}{2}$

8. Let $f(x) = 2x^3 - ax + b$. $x^2 - 4$ is a factor of $f(x)$. Find the remainder when $f(x)$ is divided by $x - 1$.

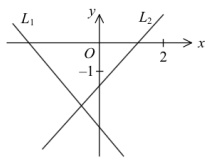
A. –6
B. –1
C. 1
D. 6

9. The base radius of a right circular cylinder is increased by 20%, while its height is decreased by p%. If the volume of the cylinder is increased by 8%, find p.

A. 10
B. 20
C. 25
D. 31

10. If p and q are positive numbers such that $\frac{p+q}{10p+2q} = \frac{q-p}{5p-q}$, then $p : q =$

A. $1 : 3$.
B. $3 : 5$.
C. $5 : 3$.
D. $3 : 1$.

11. 

In the figure, the equations of the straight lines L_1 and L_2 are $ax + by - 2 = 0$ and $px + 2y - q = 0$ respectively. Which of the following are true?

I. $b < 0$
II. $q < -2$
III. $2p + q > 0$

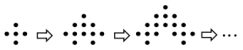
A. I and II only
B. I and III only
C. II and III only
D. I, II and III

12. Find the greatest integer satisfying $\frac{3x}{2} + 18 < 1 - 3x$ or $5 - 2x > 16$.

A. –3
B. –4
C. –5
D. –6

13. If r varies directly as the square root of s and inversely as the cube root of t, which of the following must be constant?

A. $\frac{s^3}{t^2 r^6}$
B. $\frac{s^2}{t^3 r^6}$
C. $\frac{s^3 r^6}{t^3}$
D. $\frac{s^2 r^6}{t^3}$

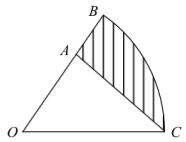
14. 

In the figure, the 1st pattern consists of 5 dots. For any positive integer n, the $(n + 1)$th pattern is formed by adding 6 dots to the nth pattern. Find the number of dots in the 8th pattern.

A. 41
B. 47
C. 53
D. 59

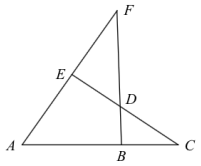
15. A frustum is made by cutting off the upper part of a right circular cone with base radius 42 cm. The radius of the top circular surface of the frustum is 24 cm. The volume of the frustum is 8370π cm^3. Find the height of the frustum.

A. 6.1 cm
B. 7.5 cm
C. 10 cm
D. 17.5 cm

16. 

In the figure, O is the centre of the sector OBC. A is a point on OB. $OA = 10$ cm, $OC = 17$ cm and $AC = 9$ cm. Find the area of the shaded region correct to 3 significant figures.

A. 21.3 cm^2
B. 27.2 cm^2
C. 29.6 cm^2
D. 34.8 cm^2

17. 

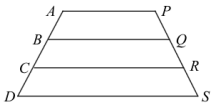
In the figure, ABC and AEF are straight lines. $\Delta ABF \sim \Delta DBC$. BF intersects CE at D. $AF = 143$ cm, $BD = 15$ cm and $DF = 117$ cm. Find the area of ΔDEF.

A. 2430 cm^2
B. 2852 cm^2
C. 2970 cm^2
D. 3630 cm^2

18. $ABCDEF$ is a regular hexagon. Which of the following are true?

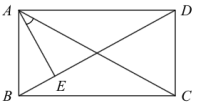
I. $\angle ACB = 30°$.
II. $\Delta CFE \cong \Delta CFD$.
III. ΔACE is an equilateral triangle.

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

19. 

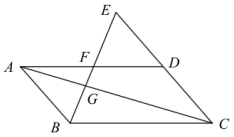
In the figure, $ABCD$ and $PQRS$ are straight lines. $AB = BC = CD$ and $AP \parallel BQ \parallel CR \parallel DS$. $AP = 8$ cm and $DS = 12$ cm. Find the ratio of the area of $BCRQ$ to the area of $ADSP$.

A. 1 : 6
B. 1 : 4
C. 1 : 3
D. 1 : 2

20. 

$ABCD$ is a rectangle. E is a point on BD such that $AE \perp BD$. If $\angle BDC = 76°$, find $\angle CAE$.

A. 14°
B. 38°
C. 52°
D. 62°

21. 

In the figure, BE cuts AD and AC at F and G respectively. CDE is a straight line. $AD \parallel BC$. Suppose $BG : GF : FE = 5 : 3 : 8$. Find the ratio of the area of ΔABG to the area of ΔDEF.

A. 3 : 4
B. 15 : 16
C. 45 : 46
D. 1 : 1