N5 Maths Top-Up Prelim Revision Questions

Revise Your Notes → **Practise Topic-by-Topic Questions** → Complete Practice Papers

Formula Sheet

The roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle $A = \frac{1}{2}ab\sin C$

Volume of a sphere $V = \frac{4}{3}\pi r^3$

Volume of a cone $V = \frac{1}{3}\pi r^2 h$

Volume of a pyramid $V = \frac{1}{3}Ah$

Standard deviation $s = \sqrt{\dfrac{\Sigma(x - \bar{x})^2}{n - 1}}$

or $s = \sqrt{\dfrac{\Sigma x^2 - \dfrac{(\Sigma x)^2}{n}}{n - 1}}$

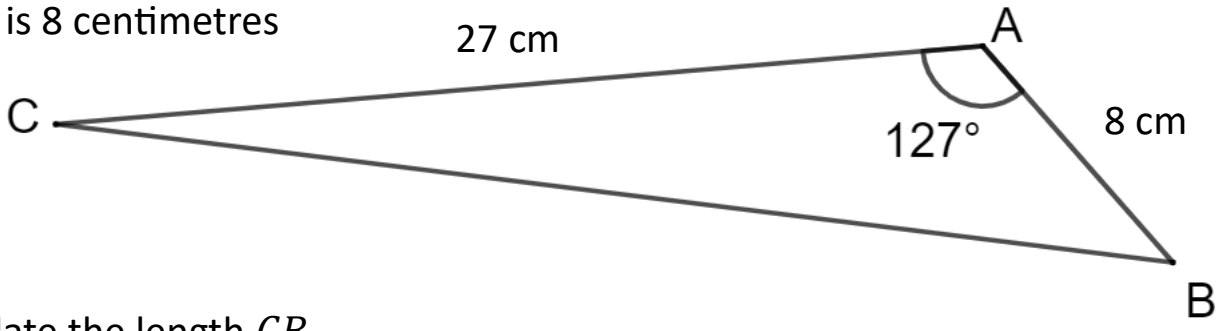
Topic List

Topic	Notes
The Cosine Rules	
Algebraic Fractions	
Trig Equations	
Quadratics II	
Vectors	

<u>The Cosine Rules</u> *(Calculator)*

1. Triangle ABC is shown in the diagram below:

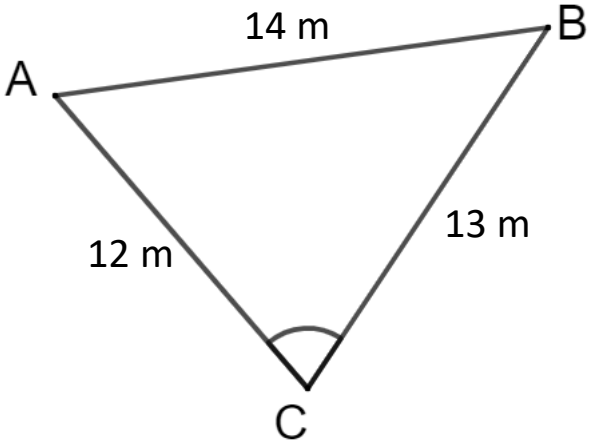
   - Angle CAB is $127°$
   - AC is 27 centimetres
   - AB is 8 centimetres



   Calculate the length CB.

2. Triangle ABC is shown in the diagram below:

   - BC is 13 metres
   - AC is 12 metres
   - AB is 14 metres



   Calculate the size of angle ACB.

Algebraic Fractions *(Non-calculator)*

3. a) Factorise:

$$x^2 - 25$$

b) Hence simplify:

$$\frac{x^2 - 25}{x^2 + 2x - 15}$$

4. Simplify:

$$\frac{x + 4}{5} + \frac{2x - 1}{3}$$

5. Simplify:

$$\frac{2}{x + 3} + \frac{5}{x - 2}$$

6. Simplify:

$$\frac{5}{3x} - \frac{2}{x^2}$$

7. Simplify:

$$\frac{2p}{3k} \div \frac{4p^2}{k^2}$$

Trig Equations *(Calculator)*

8. Solve the equation $5 \sin x° + 3 = 7, \quad 0 \leq x \leq 360$

9. Solve the equation $2 \tan x° - 4 = 5, \quad 0 \leq x \leq 360$

10. Solve the equation $4 \cos x° + 7 = 6, \quad 0 < x < 360$

11. Solve the equation $4 + 3 \sin x° = 2, \quad 0 \leq x < 360$

12. Solve the equation $5 - 3 \tan x° = 1, \quad 0 \leq x < 360$

Quadratics II *(Calculator)*

13. Express $x^2 + 12x + 34$ in the form $(x + a)^2 + b$.

14. Express $x^2 - 8x + 21$ in the form $(x + a)^2 + b$.

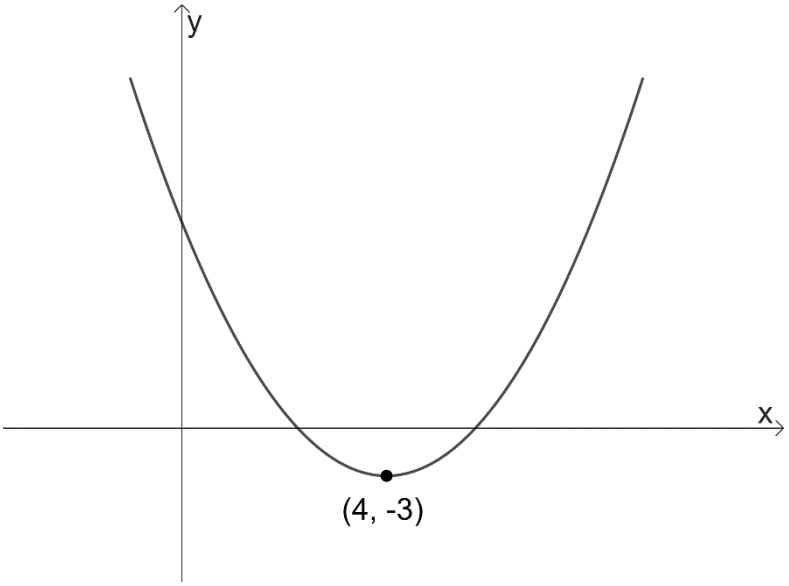
15. State the coordinates of the turning point on the graph of $y = (x + 5)^2 + 3$.

16. The graph below shows part of a parabola of the form $y = (x + a)^2 + b$.

a) State the value of a

b) State the value of b

c) State the equation of the axis of symmetry



17. Determine the nature of the roots of the function $f(x) = 2x^2 + 6x - 1 = 0$

18. Determine the nature of the roots of the equation $f(x) = x^2 - 2x + 5 = 0$

19. Solve the equation $2x^2 + 3x - 4 = 0$.

Give your answers correct to one decimal place.

20. Find the roots of the equation:

$$4x^2 - 7x + 2 = 0$$

Give your answers correct to one decimal place.

Vectors *(Non-calculator)*

21. Given $\underline{\boldsymbol{u}} = \begin{pmatrix} 5 \\ 1 \end{pmatrix}$ and $\underline{\boldsymbol{v}} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$, find the components of vector $3\underline{\boldsymbol{u}} + \underline{\boldsymbol{v}}$.

22. Given $\underline{\boldsymbol{a}} = \begin{pmatrix} 5 \\ -1 \\ 4 \end{pmatrix}$ and $\underline{\boldsymbol{b}} = \begin{pmatrix} 3 \\ 1 \\ -2 \end{pmatrix}$, find the components of vector $\underline{\boldsymbol{b}} - \underline{\boldsymbol{a}}$.

23. Given vector $\underline{\boldsymbol{w}} = \begin{pmatrix} 6 \\ -8 \end{pmatrix}$, determine the value of $|\underline{\boldsymbol{w}}|$.

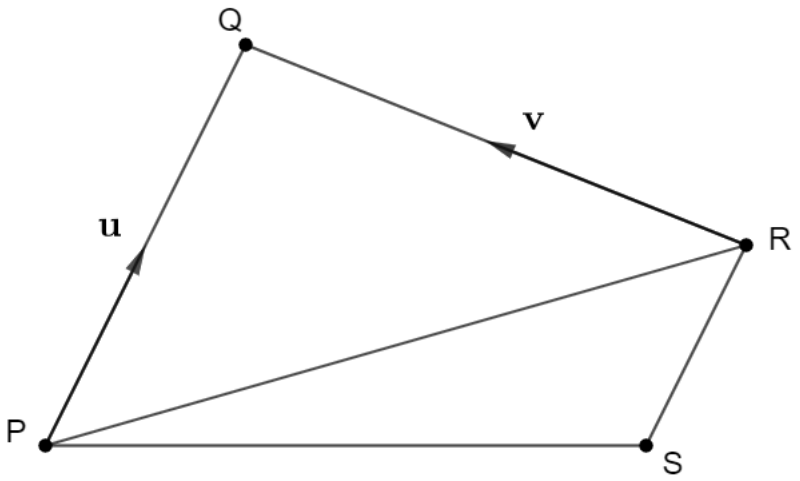
24. Given $\underline{\boldsymbol{p}} = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$ and $\underline{\boldsymbol{q}} = \begin{pmatrix} 0 \\ -4 \\ -3 \end{pmatrix}$, determine the value of $|\underline{\boldsymbol{p}} + \underline{\boldsymbol{q}}|$.

25. In the diagram below, $\overrightarrow{PQ}$ and $\overrightarrow{RQ}$ represent the vectors $\underline{\boldsymbol{u}}$ and $\underline{\boldsymbol{v}}$ respectively.

- $\overrightarrow{PQ} = 2\overrightarrow{SR}$

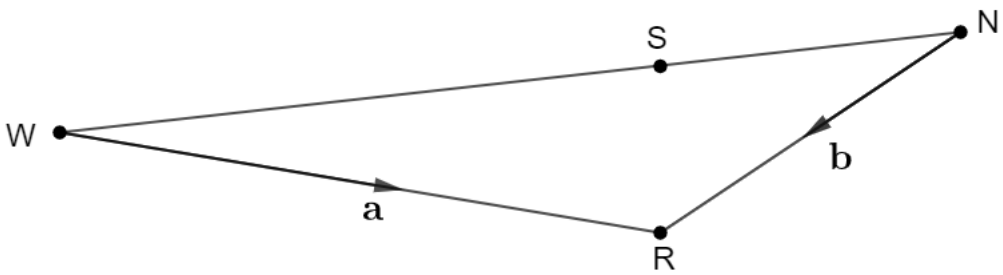
a) Express $\overrightarrow{PR}$ in terms of $\underline{\boldsymbol{u}}$ and $\underline{\boldsymbol{v}}$.

b) Express $\overrightarrow{PS}$ in terms of $\underline{\boldsymbol{u}}$ and $\underline{\boldsymbol{v}}$.



26. In the diagram below, $\overrightarrow{WR}$ and $\overrightarrow{NR}$ represent the vectors $\underline{\boldsymbol{a}}$ and $\underline{\boldsymbol{b}}$ respectively.

- $\overrightarrow{WS} = 2\overrightarrow{SN}$



a) Express $\overrightarrow{WN}$ in terms of $\underline{\boldsymbol{a}}$ and $\underline{\boldsymbol{b}}$.

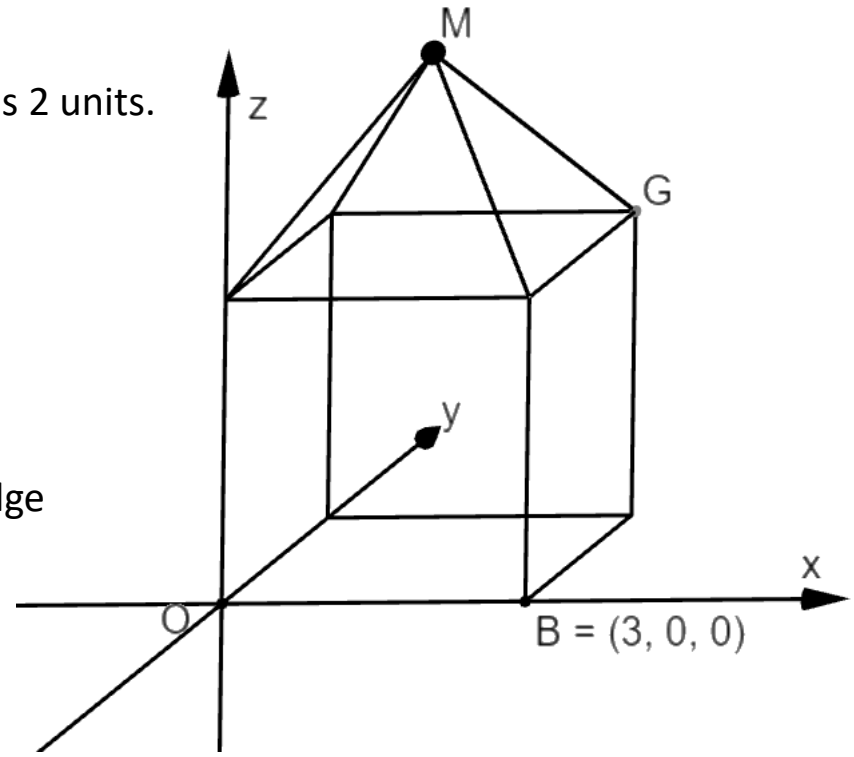
b) Express $\overrightarrow{SR}$ in terms of $\underline{\boldsymbol{a}}$ and $\underline{\boldsymbol{b}}$.

27. The diagram shows a square-based pyramid on top of a cube, relative to the coordinate axes.

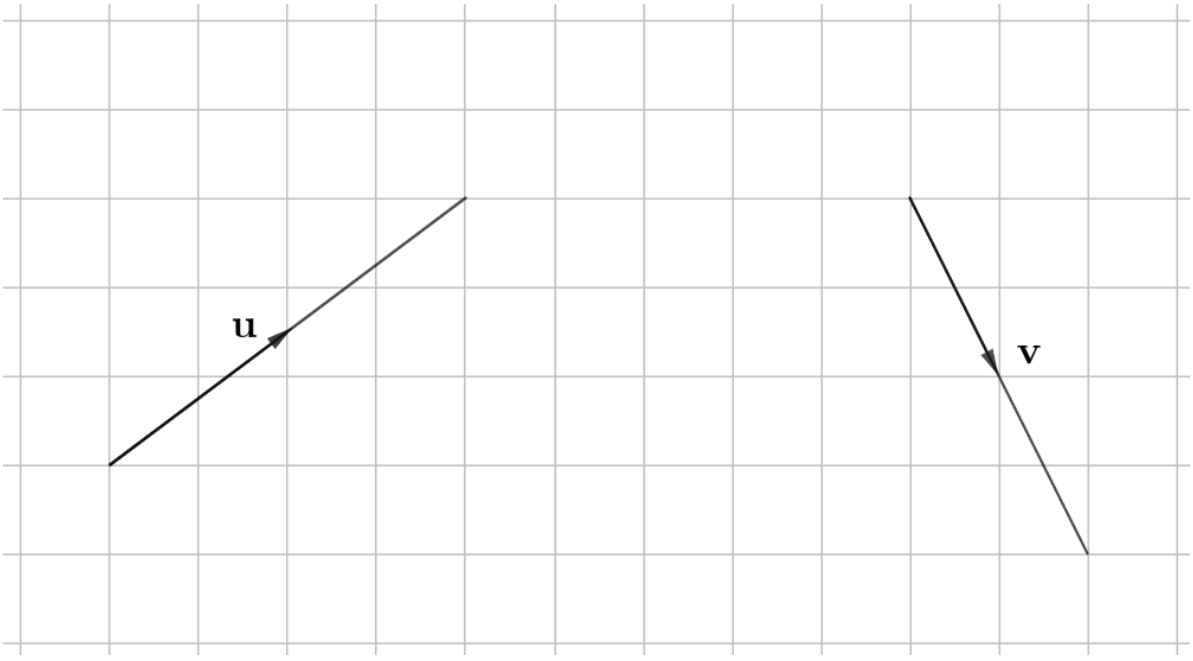
- The height of the pyramid is 2 units.
- B is the point $(3,0,0)$

a) Find the coordinates of the point M.

b) Determine the length of edge MG of the pyramid.



28. The vectors $\underline{\boldsymbol{u}}$ and $\underline{\boldsymbol{v}}$ are shown in the diagram below.



Find the resultant vector $\underline{\boldsymbol{u}} + \frac{1}{2}\underline{\boldsymbol{v}}$.

Express your answer in component form.

Answers

Question	Answer	Question	Answer
1	$32.45cm$	15	$(-5,3)$
2	$68.0°$	16	$a=-4, b=-3, x=4$
3	$\frac{x-5}{x-3}$	17	$44>0$ real distinct roots
4	$\frac{13x+7}{15}$	18	$-16<0$ no real roots
5	$\frac{7x+11}{(x+3)(x-2)}$	19	$x=0.9, x=-2.4$
6	$\frac{5x-6}{3x^2}$	20	$x=1.4, x=0.4$
7	$\frac{k}{6p}$	21	$\binom{19}{0}$
8	$x°=53.1°, 126.9°$	22	$\begin{pmatrix}-2\\2\\-6\end{pmatrix}$
9	$x°=77.5°, 257.5°$	23	10
10	$x°=104.5°, 255.5°$	24	$\sqrt{35}$
11	$x°=221.8°, 318.2°$	25	$\overrightarrow{PR}=\underline{\boldsymbol{u}}-\underline{\boldsymbol{v}}, \overrightarrow{PS}=\frac{1}{2}\underline{\boldsymbol{u}}-\underline{\boldsymbol{v}}$
12	$x°=53.1°, 233.1°$	26	$\overrightarrow{WN}=\underline{\boldsymbol{a}}-\underline{\boldsymbol{b}}, \overrightarrow{SR}=\frac{1}{3}\underline{\boldsymbol{a}}+\frac{2}{3}\underline{\boldsymbol{b}}$
13	$(x+6)^2-2$	27	$M(1.5,1.5,5), 2.92\ units$
14	$(x-4)^2+5$	28	$\binom{5}{1}$

The purpose of this revision booklet

As a first step in your revision for the Top-Up Prelim Exam, it is important to revise all the **key skills** you have met in the topics covered since the main Prelim Exam. This booklet aims to give you a chance to test your understanding of those key skills, so that you know when you are ready to begin working through the practice exam papers available on the National 5 Revision Page. You should use your notes and examples from class to help structure your solutions, asking for help with anything you don't understand.

Next steps

Once you have made sure you understand how to complete all the key skills featured in this revision booklet, it is important that you properly prepare for your Prelim Exam by **thoroughly practising exam questions**.