SUPERVISOR'S USE ONLY

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See back cover for an English translation of this cover.

91947M

919475

Tuhia he (☒) ki te pouaka mēnā kāore koe i tuhi kōrero ki tēnei puka

+

NZQA

Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Te Pāngarau me te Tauanga, Kaupae 1, 2024

91947M Te whakaatu take pāngarau

Ngā whiwhinga: E rima

Paetae	Kaiaka	Kairangi
Te whakaatu take pāngarau.	Te whakaatu take pāngarau mā te whakaaro ā-pānga.	Te whakaatu take pāngarau mā te whakaaro waitara e whānui ana.

Tirohia kia kitea ai e rite ana te Tau Ākonga ā-Motu (NSN) kei runga i tō puka whakauru ki te tau kei runga i tēnei whārangi.

Me whakamātau koe i ngā tūmahi KATOA kei roto i tēnei pukapuka.

Tangohia Te Pukapuka Rauemi 91947MR i te puku o te pukapuka nei.

Whakaatuhia ngā whiriwhiringa KATOA.

Mēnā ka hiahia wāhi atu anō koe mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka.

Tirohia kia kitea ai e tika ana te raupapatanga o ngā whārangi 2–31 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

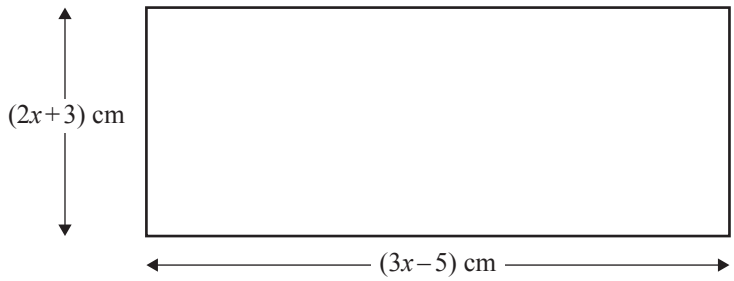
Kaua e tuhi ki tētahi wāhi e kitea ai te kauruku whakahāngai (////). Ka poroa taua wāhanga ka mākahia ana te pukapuka.

HOATU TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.

TE TŪMAHI TUATAHI

Ko te paenga o tētahi āhua, ko te tawhiti huri noa i taua āhua.

(a) Ko te 56 mitarau (cm) te paenga o te tapawhā hāngai e whakaatuhia ana i raro nei.



KĀORE i tuhia ā-āwhatatia te hoahoa

Whakaritea tētahi whārite ka whakaotihia ai hei whiriwhiri i te uara o x.

(b) I tētahi tapatoru o ABC, ko te roa o te taha o AB = y cm.

E $\boldsymbol{k}$ cm te roanga ake o te taha o AC i te taha o AB, ā, e nui ake ana a $\boldsymbol{k}$ i te 2.

E 4 cm te potonga iho o te taha o BC i te taha o AC.

E **rima whakareanga** te nui ake o te paenga o te tapatoru i te roa o AB.

Whiriwhiria te **paenga** o te tapatoru o ABC, ā, homai tō tuhinga e ai ki te $\boldsymbol{k}$.

QUESTION ONE

The perimeter of a shape is the distance around the outside of the shape.

(a) The perimeter of the rectangle shown below is 56 cm.

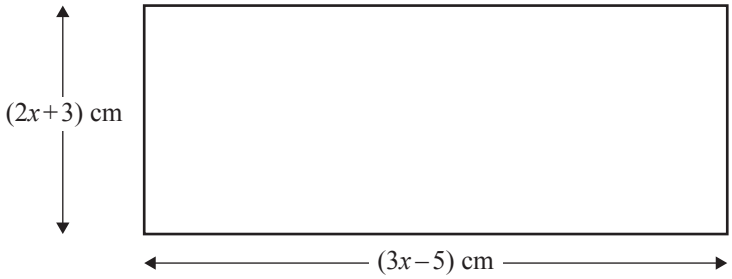


Diagram is NOT to scale

Form an equation and solve it to find the value of x.

(b) In a triangle ABC, the length of the side AB = y cm.

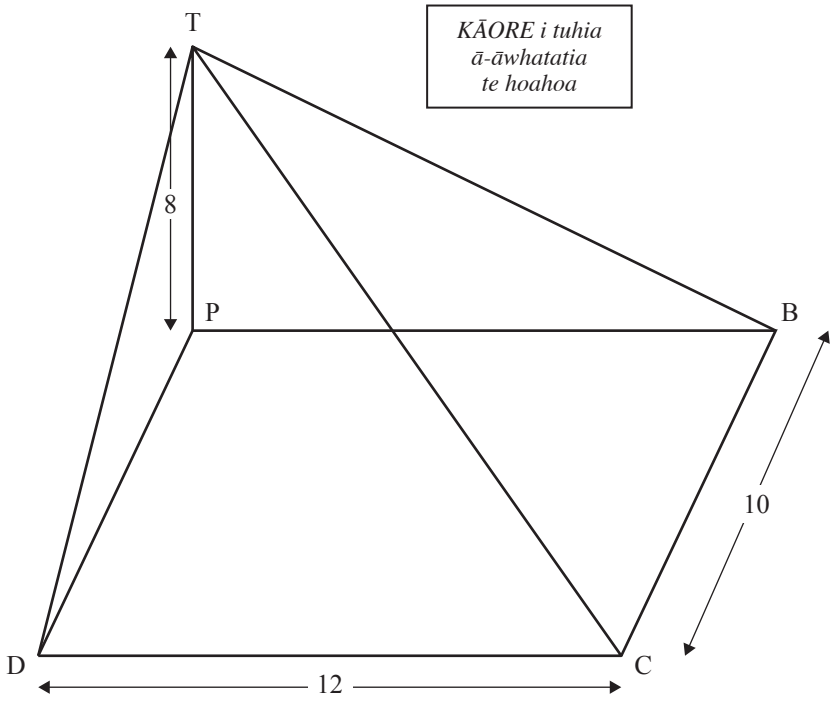
The side AC is $\boldsymbol{k}$ cm longer than the side AB, where $\boldsymbol{k}$ is bigger than 2.

The side BC is 4 cm shorter than the side AC.

The perimeter of the triangle is **five times** the length of AB.

Find the **perimeter** of the triangle ABC, giving your answer in terms of $\boldsymbol{k}$.

(c) E whakaatuhia ana i te hoahoa i raro nei tētahi rārangi poutū, arā, te PT.



KĀORE i tuhia ā-āwhatatia te hoahoa

E hono ana ngā pūwāhi katoa o B, o C, me D ki a T.

Ka puta i ngā pūwāhi o P, o B, o C, me D tētahi tapawhā hāngai.

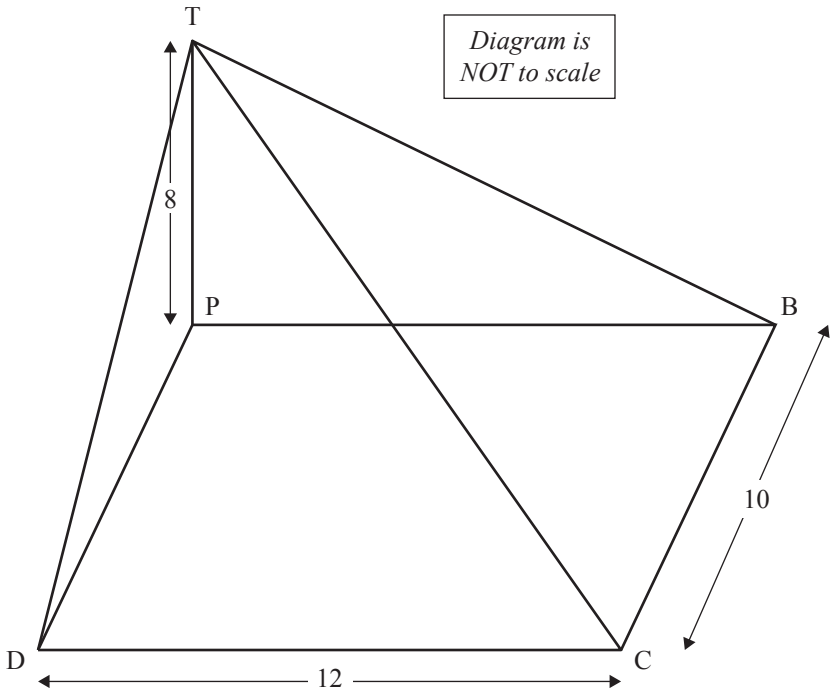
E hāngai ana ngā rārangi o PB me PD ki a PT.

Ko PT = e 8, ko DC = 12, ko BC = 10

He inenga ā-mita te katoa o ngā roanga.

Tātaihia te roa o te rārangi e hono ana i a C ki a T, mā te whakaatu i ō whiriwhiringa.

(c) The diagram below shows a vertical line PT.



The points B, C, D are all joined to T.

The points P, B, C, D form a rectangle.

The lines PB and PD are both perpendicular to PT.

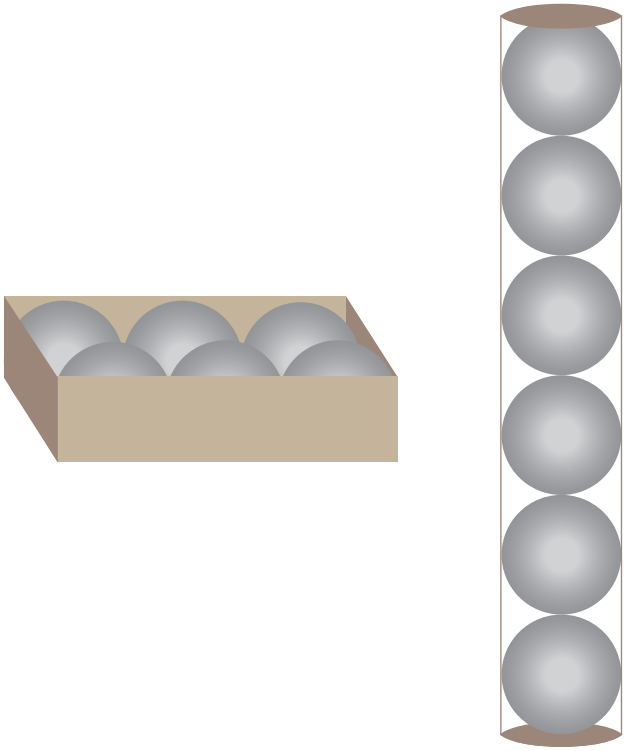
PT = 8, DC = 12, BC = 10

All lengths are in metres.

Calculate the length of the line joining C to T, showing your working.

(d) He hanga ahu-toru te poi e pēnei ana i te pōro te āhua.

E whakaatuhia ana i te hoahoa tētahi pouaka tapawhā hāngai e ono ōna poi.



E whakaatuhia ana hoki te ō atu o ērā poi e ono ki tētahi ngongo rango.

Ka pipiri te noho o ngā poi ki roto i te pouaka me te ngongo, pēnei i tēnei e whakaatuhia ana.

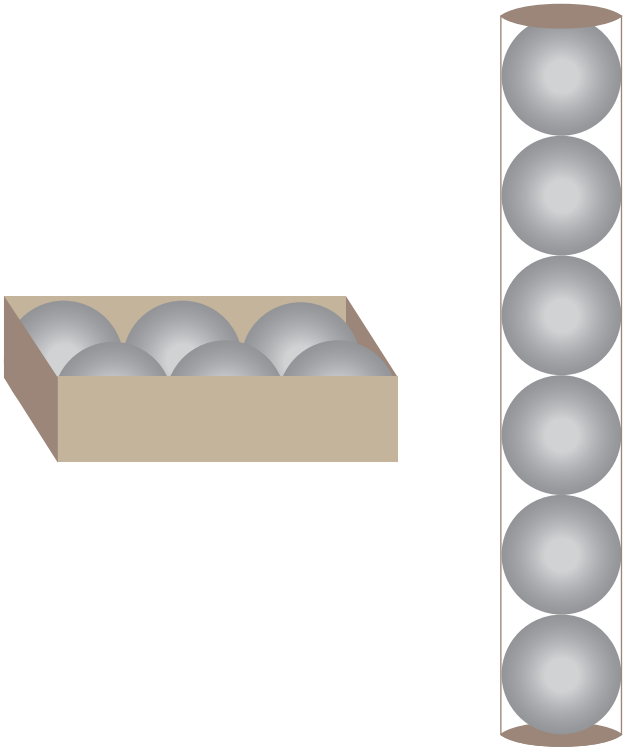
He ōrite pū te rahinga o ngā poi katoa i roto i te pouaka me te ngongo.

Ko te 150 cm^3 te rōrahi o ia poi.

Whakaatuhia, kia mārama, ō whiriwhiringa hei whakatau i te ipu, te tapawhā hāngai rānei, te rango rānei, e nui ake ana te wāhi wātea mā te tātai i te **ōrau** o te wāhi wātea i roto i ia ipu.

(d) A sphere is a three-dimensional object shaped like a ball.

The diagram shows a rectangular box containing six spheres.



The diagram also shows how the same six spheres could be packaged into a cylindrical tube.

The spheres fit tightly into the box and tube, as shown.

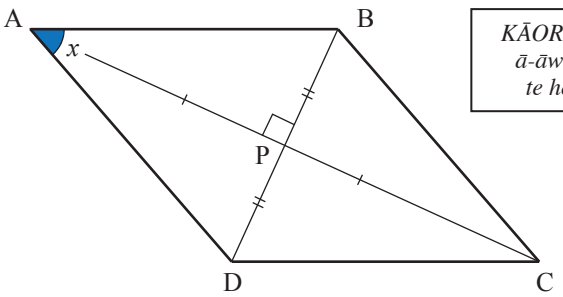
All spheres in both the box and the tube are exactly the same size.

The volume of each sphere is 150 cm^3.

Show clear working to decide which container, rectangular or cylindrical, has the greater empty space by calculating the **percentage** of empty space inside each container.

TE TŪMAHI TUARUA

(a) E whakaatuhia ana i te hoahoa tētahi tapawhā whakarara rite. He āhua te tapawhā whakarara rite e whā ōna taha e ōrite ana te roa. Ko te 10 mitarau (cm) te roa o te hauroki o BD, ā, ko te 60 cm te roa o te paenga.



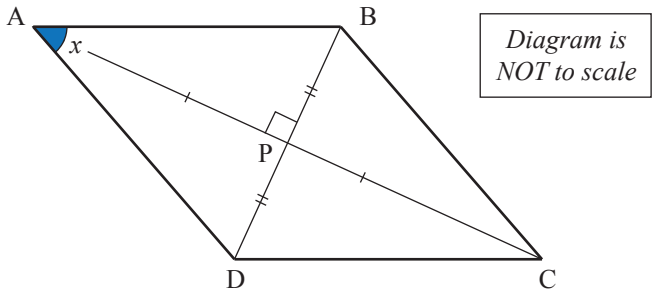
KĀORE i tuhia ā-āwhatatia te hoahoa

Whiriwhiria te rahinga, te x, o te koki o BAD.

Whakaatuhia ō whiriwhiringa kia mārama.

QUESTION TWO

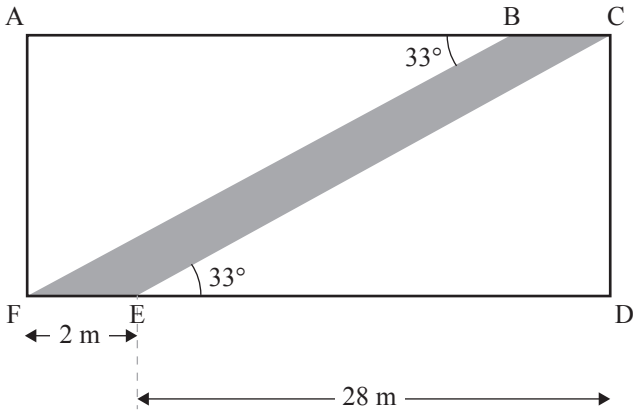
(a) The diagram shows a rhombus. A rhombus is a shape with four equal-length sides.
The length of the diagonal BD is 10 cm, and the length of the perimeter is 60 cm.



Find the size, x, of angle BAD.

Show your working clearly.

(b) E whakaatuhia ana i te hoahoa i raro nei tētahi tapawhā hāngai me tētahi tāhei kiwikiwi o roto.
E whakarara ana ngā rārangi o FB me EC ki a rāua anō.
Te koki o CED = te koki o ABF = e 33°.
Ko FE = e 2 mita, ko ED = e 28 mita.



KĀORE i tuhia ā-āwhatatia te hoahoa

Whiriwhiria te horahanga o te tāhei o BCEF.

(b) The diagram below shows a rectangle with a grey stripe through it.

Lines FB and EC are parallel to each other.

Angle CED = angle ABF = 33°.

FE = 2 metres, ED = 28 metres.

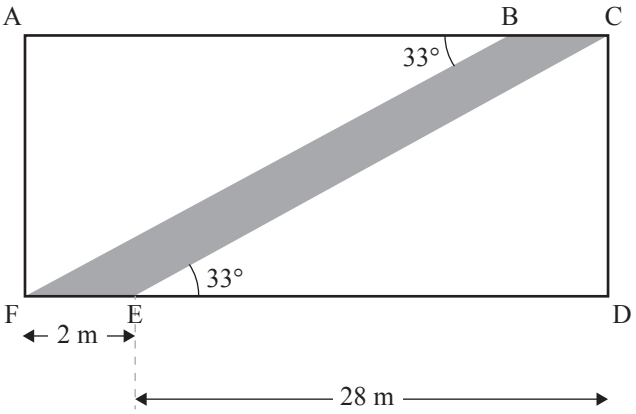
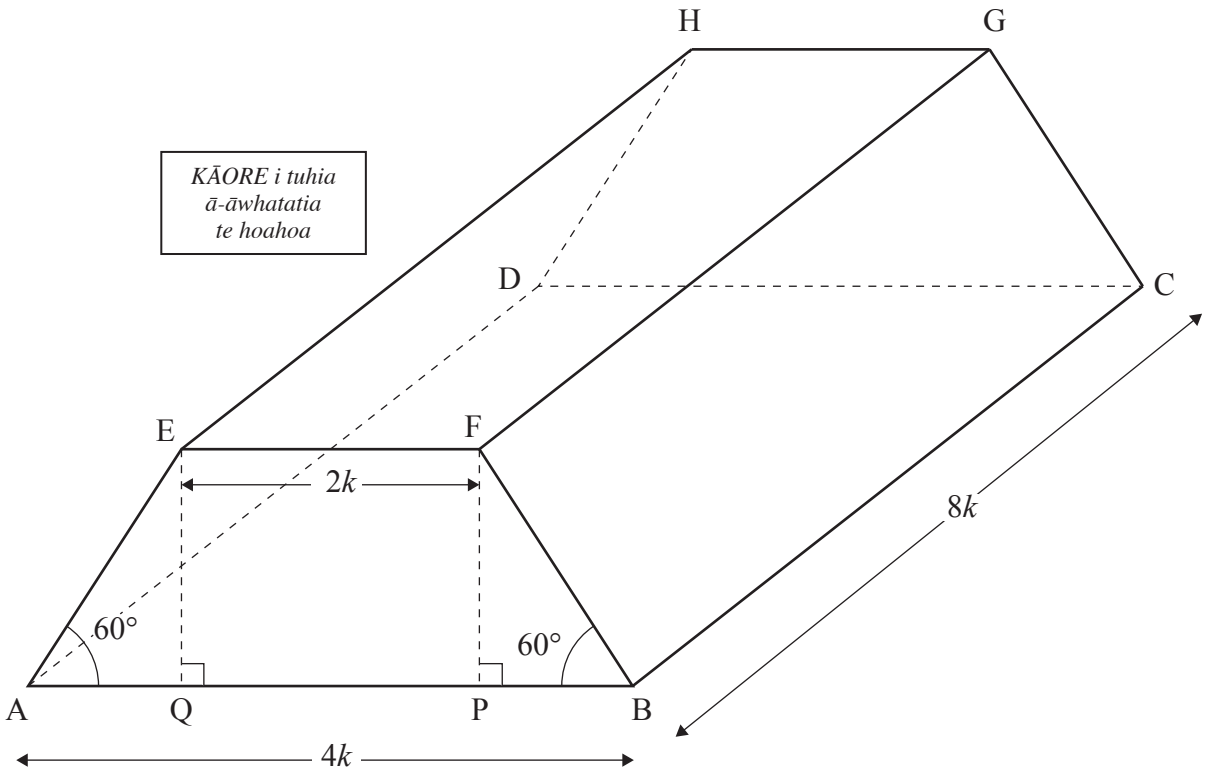


Diagram is NOT to scale

Find the area of the stripe BCEF.

(c) E whakaatuhia ana i te hoahoa i raro nei tētahi poro me te pūtake tapawhā hāngai o ABCD.
He taparara hangarite te motuhanga o ABFE, ā, ko AE = BF.
Ko AB = ko $4k$, ko EF = ko $2k$, ko BC = ko $8k$, ko te koki o ABF = ko te 60°.
He inenga ā-mita te katoa o ngā roanga.



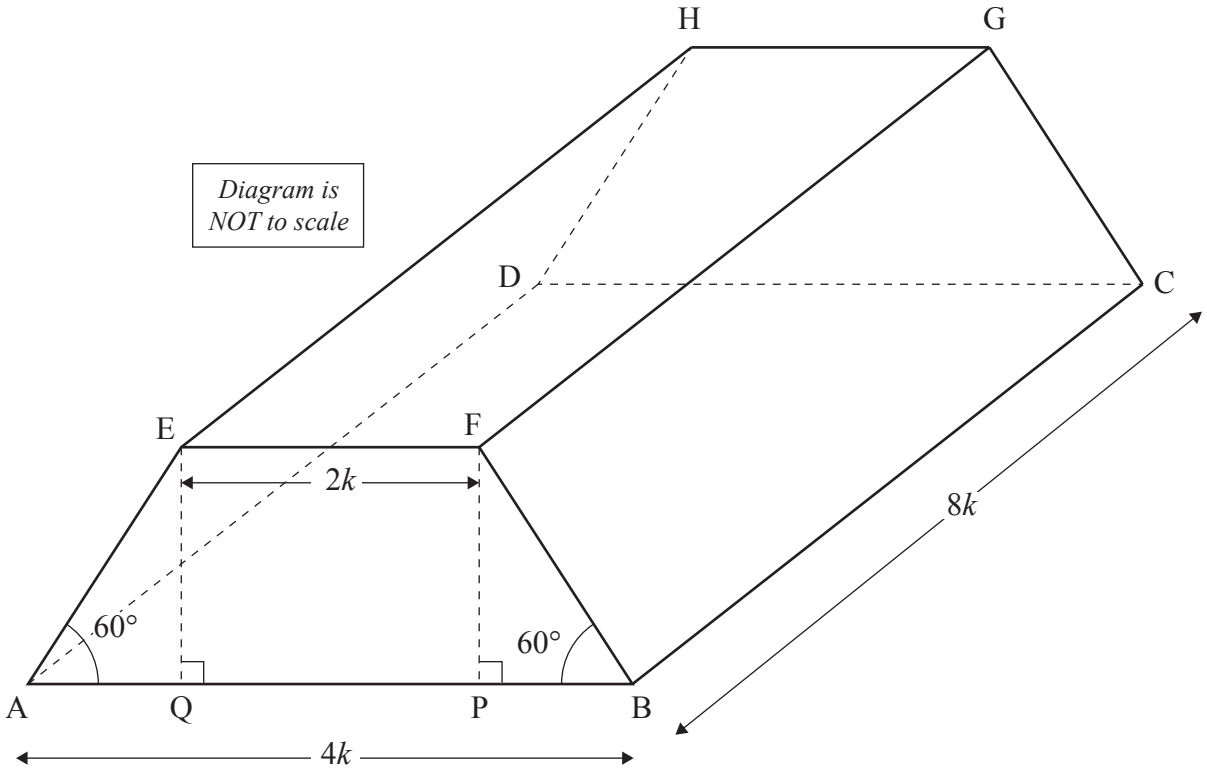
(i) Whakaatuhia ko te roa o PF = ko te $1.7321k$ mita.
Whakaatuhia ō whiriwhiringa kia mārama.

(c) The diagram below shows a prism with rectangular base, ABCD.

The cross-section, ABFE, is a symmetrical trapezium, with AE = BF.

AB = $4k$, EF = $2k$, BC = $8k$, angle ABF = 60°.

All lengths are in metres.



(i) Show that the length PF = 1.7321k metres.

Show your working clearly.

(ii) Mehemea ko te rōrahi o te poro o ABCDEFGH, ko te 649.519 mita^3, whiriwhiria te uara o k.

(ii) Given that the volume of the prism ABCDEFGH is 649.519 metres^3, find the value of k.

TE TŪMAHI TUATORU

(a) Whiriwhiria ngā taunga o te haukotinga tuaka pou i te kauwhata taupūtanga $y = 5^{3x+2} + 4$.

(b) E whakaatuhia ana tētahi raupapa i te tūtohi i raro nei:

x	y
1	24
2	35
3	48
4	63
5	80

(i) Whiriwhiria tētahi whārite e whakaatu ana i te y, ahakoa te uara o x.
Parahautia tō tuhinga mā te whakaatu i ngā whiriwhiringa pāngarau e whai tikanga ana.

QUESTION THREE

(a) Find the co-ordinates of the y-axis intercept for the exponential graph $y = 5^{3x+2} + 4$.

(b) A sequence is shown in the table below:

x	y
1	24
2	35
3	48
4	63
5	80

(i) Find an equation that represents y, for any given x-value.
Justify your answer by showing appropriate mathematical working.

(ii) Mehemea ka tuhia te kauwhata o y, e ai ki ngā uara katoa o x, tautuhia ngā āhuatanga o te kauwhata o y, mā te whakamahi i tō tuhinga i (b)(i).

I tō tuhinga, whakaahuatia kia kaua e iti iho i ngā āhuatanga rerekē e TORU.

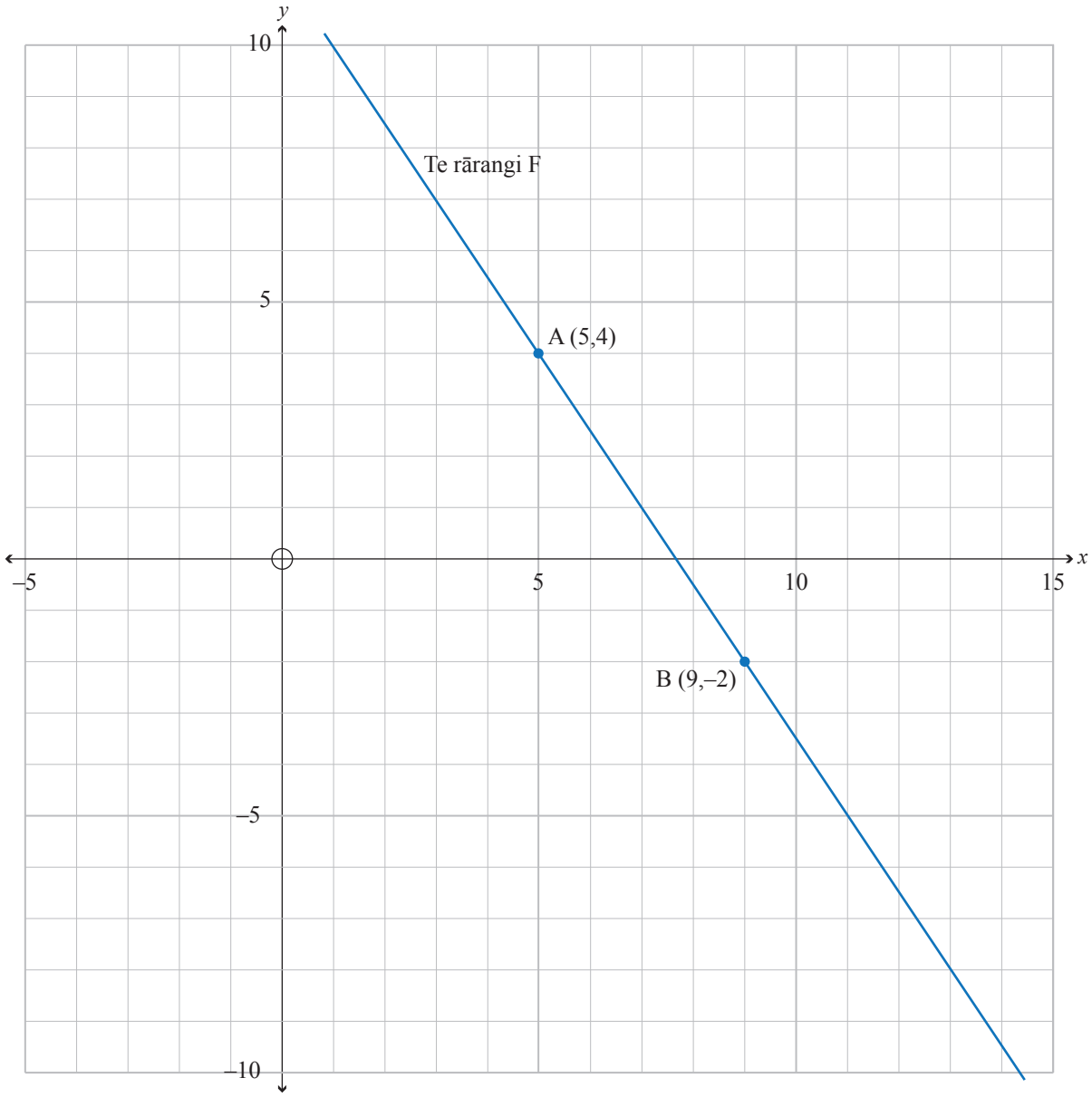
Ka rere tonu te Tūmahi Tuatoru i te whārangi e whai ake nei.

(ii) If the graph of y is drawn, for all values of x, identify the features of the graph of y, using your answer from (b)(i).

In your answer, describe at least THREE different features.

Question Three continues on the following page.

(c) Whakamahia te kauwhata i raro nei hei āwhina i a koe.

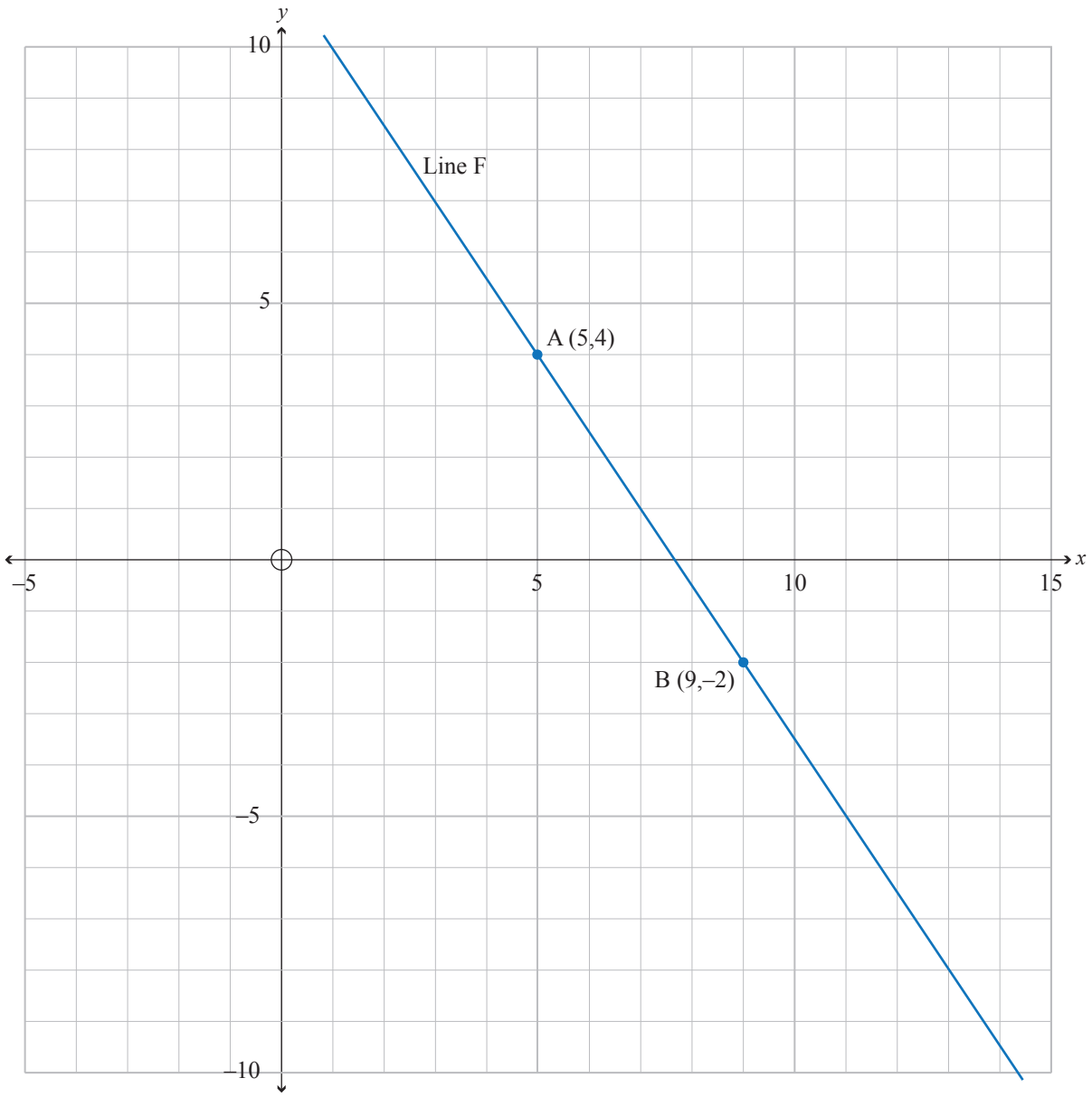


(i) Ka takoto ngā pūwāhi o A (5,4) me B (9,–2) ki te rārangi kahurangi, kua tapaina ki te F, e whakaatuhia ana i te hoahoa i runga ake.

Mehemea me tuhi anō tō urupare ki te wāhanga (ii), whakamahia te hoahoa kei te whārangi 26.

Whiriwhiria tētahi whārite o te rārangi o F.

(c) Use the diagram below to help you.



(i) The points A (5,4) and B (9,–2) lie on the blue line, labelled F, shown in the diagram above.

Find an equation of the line F.

If you need to redraw your response to part (ii), use the diagram on page 27.

(ii) He whārite tō tētahi rārangi tuarua, tō G, arā, ko te $x - 2y - 9 = 0$.

Whiriwhiria ngā taunga o te pūwāhi e pūtahi ai ngā rārangi o F me G.

Whakamahia tētahi tikanga taurangi, tētahi tikanga kauwhata RĀNEI (mā te whakamahi i te hoahoa kei te whārangi 26).

(d) Mehemea ko te $3^{2x+3} \times 9^{x} = 3^{4-3y}$, whiriwhiria he kīanga mō y e ai ki te x.

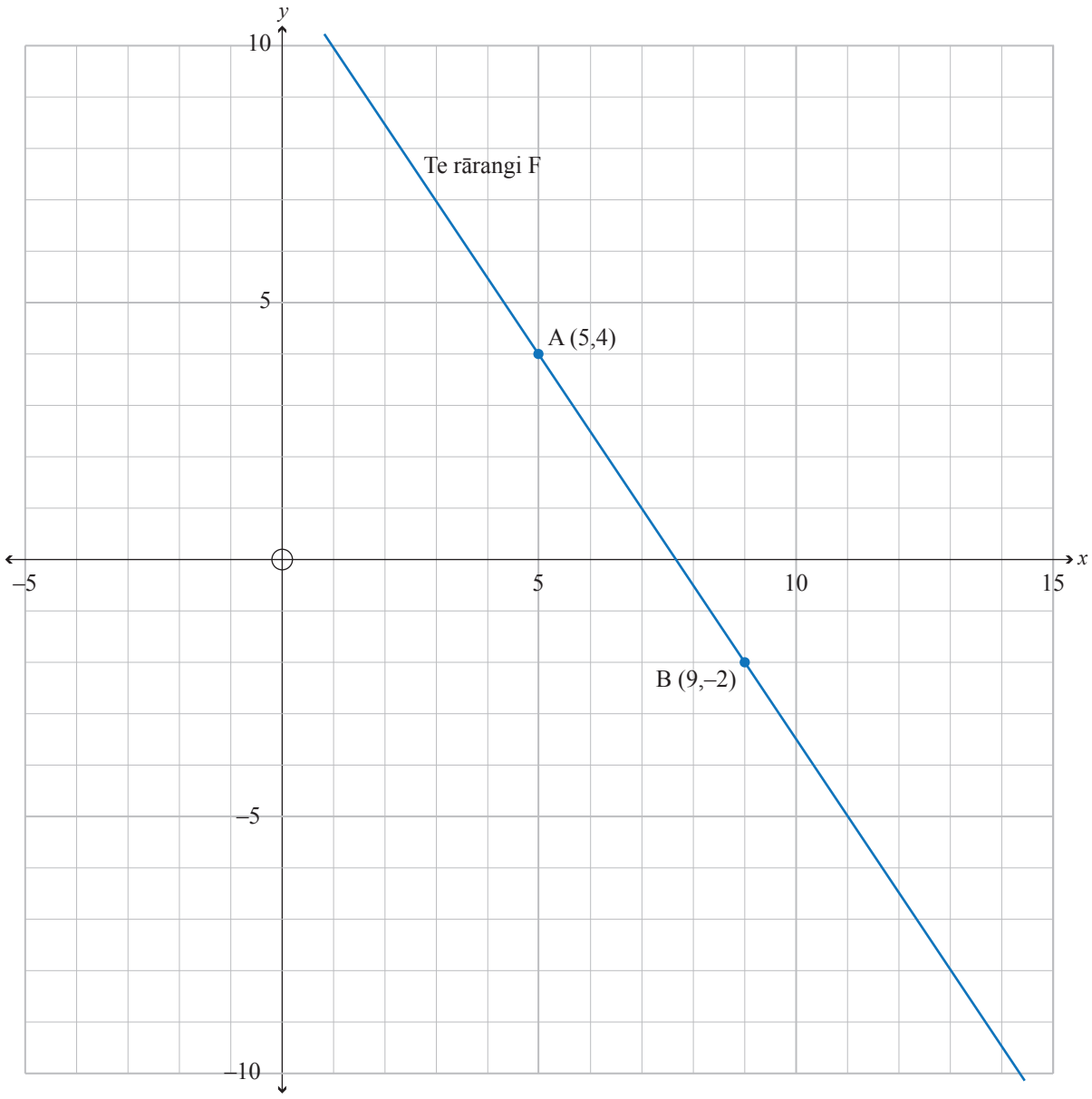
(ii) A second line, G, has equation $x - 2y - 9 = 0$.

Find the co-ordinates of the point where the lines F and G intersect each other.
Use either an algebraic method OR a graphical method (using the diagram on page 27).

(d) Given that $3^{2x+3} \times 9^{x} = 3^{4-3y}$, find an expression for y in terms of x.

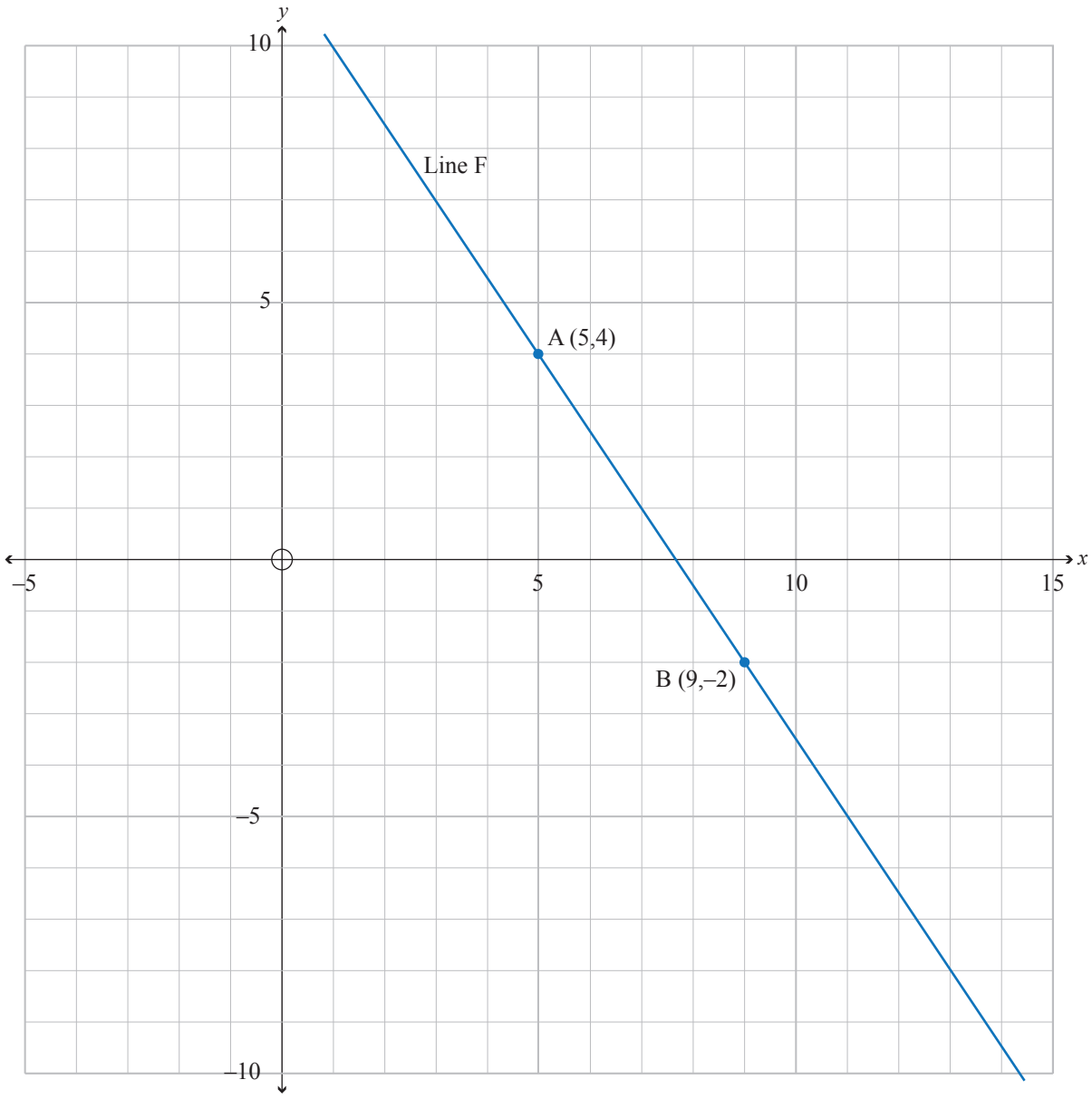
HE HOAHOA WĀTEA

Ki te hiahia koe ki te tā anō i tō urupare ki te Tūmahi Tuatoru (c), whakamahia te hoahoa kei raro nei. Me mārama tō tohu mai i te tuhinga e hiahia ana koe kia mākahia.



SPARE DIAGRAMS

If you need to redraw your response to Question Three (c), use the diagram below. Make sure it is clear which answer you want marked.



He whārangi anō ki te hiahiatia.
Tuhia te tau tūmahi mēnā e hāngai ana.

TE TAU TŪMAHI

Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

He whārangi anō ki te hiahiatia.
Tuhia te tau tūmahi mēnā e hāngai ana.

TE TAU TŪMAHI

Extra space if required.
Write the question number(s) if applicable.

QUESTION NUMBER

English translation of the wording on the front cover

Level 1 Mathematics and Statistics 2024

91947M Demonstrate mathematical reasoning

Credits: Five

91947M

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate mathematical reasoning.	Demonstrate mathematical reasoning with relational thinking.	Demonstrate mathematical reasoning with extended abstract thinking.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

Pull out Resource Booklet 91947MR from the centre of this booklet.

Show ALL working.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–31 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (▨). This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.