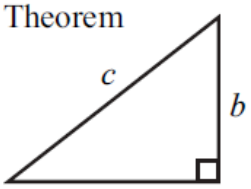
THE ENGLISH COLLEGE IN PRAGUE

YEAR 3

Mathematics Entrance Examination Practice set (C)

FORMULAE SHEET (*only some of these will be needed)

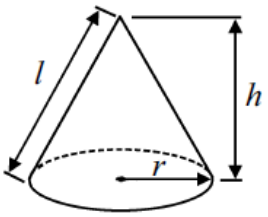
Pythagoras' Theorem



$a^2 + b^2 = c^2$

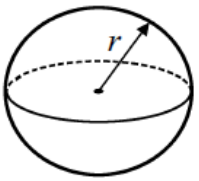
Volume of cone $= \frac{1}{3}\pi r^2 h$

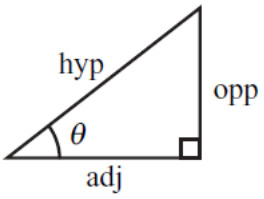
Curved surface area of cone $= \pi r l$



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

Surface area of sphere $= 4\pi r^2$





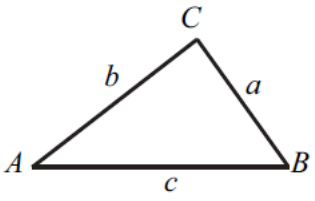
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

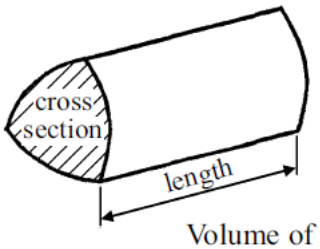
In any triangle ABC



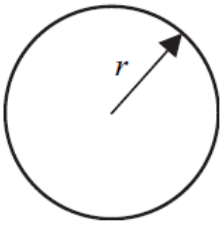
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

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



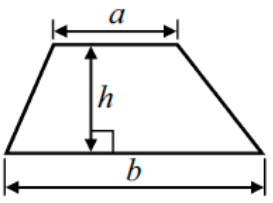
Volume of prism = area of cross section × length

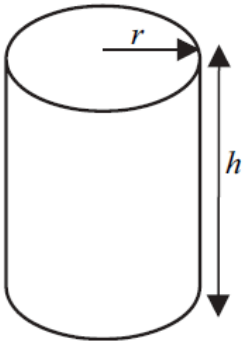


Circumference of circle $= 2\pi r$

Area of circle $= \pi r^2$

Area of a trapezium $= \frac{1}{2}(a + b)h$





Volume of cylinder $= \pi r^2 h$

Curved surface area of cylinder $= 2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Questions

1. 850 people attended a festival. 16% of the people were children
   850 lidí se zúčastnilo festivalu. 16% z nich bylo dětí.

   a) How many children were at the festival?

   Kolik dětí se zúčastnilo festivalu?

   Answer (a) ……...…….…… **[1]**

   b) What was the ratio of adults to children at the festival? Simplify your answer as much as possible.

   Jaký byl na festivalu poměr mezi dospělými a dětmi? Svou odpověď napiš v základním tvaru.

   Answer (b) ……...…….…… **[2]**

   c) The organisers are expecting ticket sales to increase by 12% next year. How many tickets do they expect to sell next year?

   Organizátoři očekávají, že prodej vstupenek příští rok vzroste o 12%. Kolik vstupenek plánují příští rok prodat?

   Answer (b) ……...…….…… **[2]**

2. A car dealer offers a discount of 15% off the normal price of a car for cash. Emma pays £6 120 cash for a car. What was the normal price of the car if there was no discount?

   Prodejce aut nabízí 15% slevu z běžné ceny, pokud zákazník platí hotově. Emma zaplatí za auto 6 120 liber v hotovosti. Jaká byla původní cena auta bez slevy?

   Answer (a) ……...…….…… **[2]**

3. Marek is organising a charity hot dog sale. The bread rolls he buys have 18 rolls in each packet. He buys hot dogs in bags of 15.

Marek pořádá charitativní prodej hotdogů. Jedno balení obsahuje 18 housek. Párky koupí v baleních po 15 kusech.

What is the **smallest** number of each packet that he can buy so that he has exactly the same number of bread rolls as hot dogs?

*Jaký je **nejmenší** možný počet balení housek a párků, které může Marek koupit, pokud chce mít stejné množství housek a párků?*

..... packets of bread rolls

balení housek

..... packets of hot dogs

balení párků

[3]

4. For each of the following sequences write down the next two terms.
V každé číselné řadě uveď dva následující členy.

a) 7, 11, 15, 19, ..., ……..

b) 11, 6, 1, -4, ..., ……..

c) 9, 16, 25, 36, ..., ……..

b) 1 000, 100, 10, 1, ……..., ……

[4]

.

5. Solve the equations, showing each step of your workings.
Vyřeš rovnice a soustavu rovnic. Uveď celý postup řešení.

(a) $3(x + 7) = 4(13 - x) + 4$

Answer (a) x = ……

[2]

(b) $x^2 + 4x + 3 = 0$

Answer (b) x = ……. and x = ……

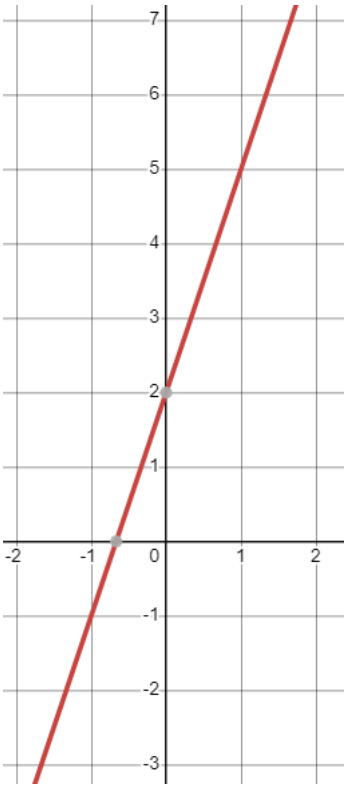
[2]

(c) $x + 4y = 5$ and $4x - 2y = 11$

Answer (c) x = …..…….. and y = ……..…

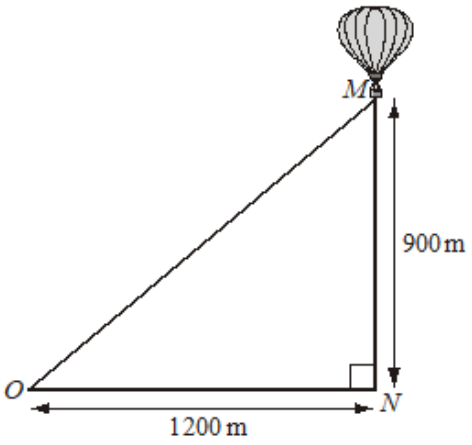
[3]

6. What is the equation of the line shown in the graph?
Jaký je předpis lineární funkce v grafu?



Answer: $y =$ ……**[2]**

7. A hot air balloon, M, is 900 metres vertically above a point N on the ground. A boy stands at a point O, 1200 metres horizontally from N.
Horkovzdušný balón M je 900 metrů vertikálně nad bodem N, který je na zemi. Chlapec stojí v bodě O, 1200 metrů horizontálně od bodu N.



NOT TO SCALE

(a) Calculate the distance, OM, of the boy from the balloon.
Vypočítej vzdálenost chlapce a balónu (OM).

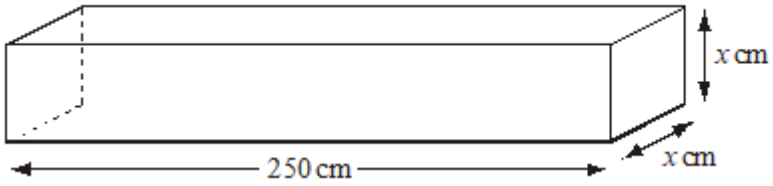
Answer (a) OM = …… m **[2]**

(b) Calculate angle MON.
Vypočítej úhel MON.

Answer (b) Angle MON = ……..

[2]

8. A solid metal bar is in the shape of a cuboid of length 250 cm. The cross-section is a square with side length x centimetres. The volume of the cuboid is 4840 cm^3.
Pevná kovová cihla má tvar kvádru s délkou 250 cm. Průřez kvádru má tvar čtverce se stranou dlouhou x centimetrů. Objem kvádru je 4840 cm^3.



NOT TO SCALE

a) Show that $x = 4.4$ cm. **You must show your workings.**
Dokaž, že x = 4,4 cm. ***Uveď postup řešení.***

b) Find the surface area of the cuboid.
Vypočítej povrch kvádru.

Answer (b) .....**[5]**

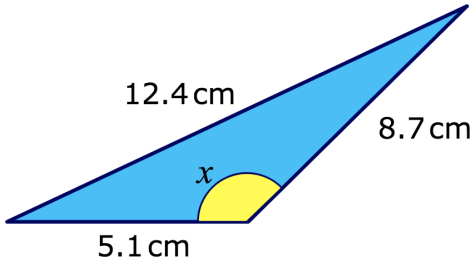
9. 18 men build a wall that is 140 metres long in 42 days. How long would it take 30 men to build a wall that is 100 metres long?

18 mužů postaví 140 m dlouhou zeď za 42 dnů. Jak dlouho by trvalo 30 mužům, než by postavili 100 m dlouhou zeď?

Answer .....**[3]**

10. a)

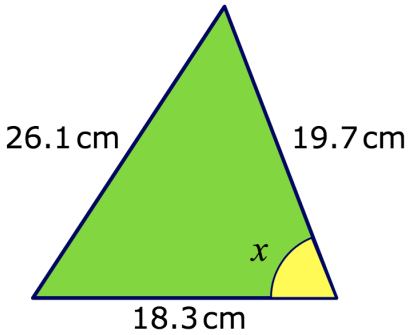
Use the cosine rule to find the angles marked x.
Give your answers to the nearest degree.



$x =$ ☐ ° [2]

b)

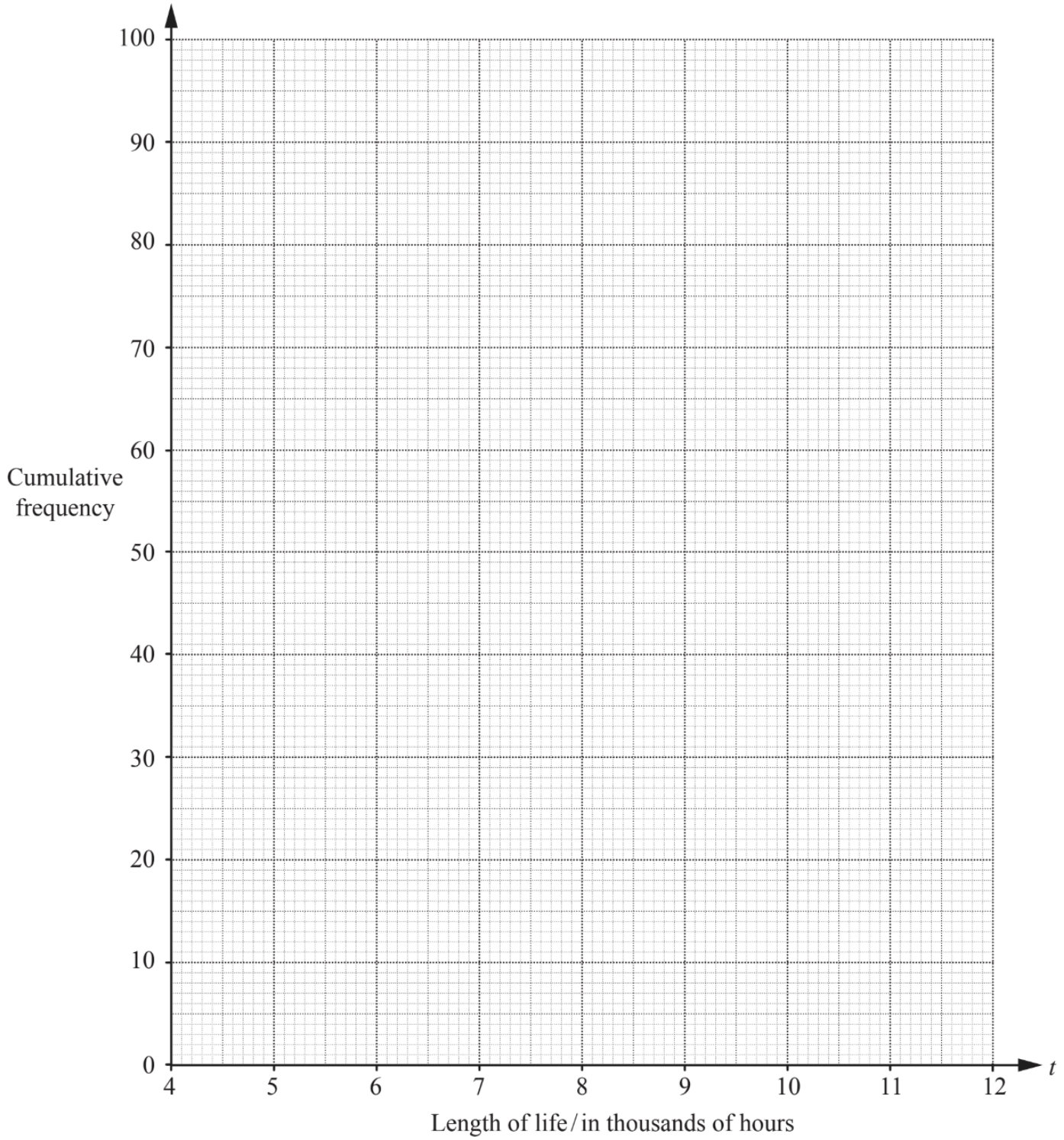
Use the cosine rule to find the angles marked x.
Give your answers to the nearest degree.



$x =$ ☐ ° [2]

11.

(b) Draw a cumulative frequency curve for the length of life of the light bulbs.



[5]

[3]

(c) Use your graph to estimate

(i) the number of light bulbs that lasted longer than 8500 hours,

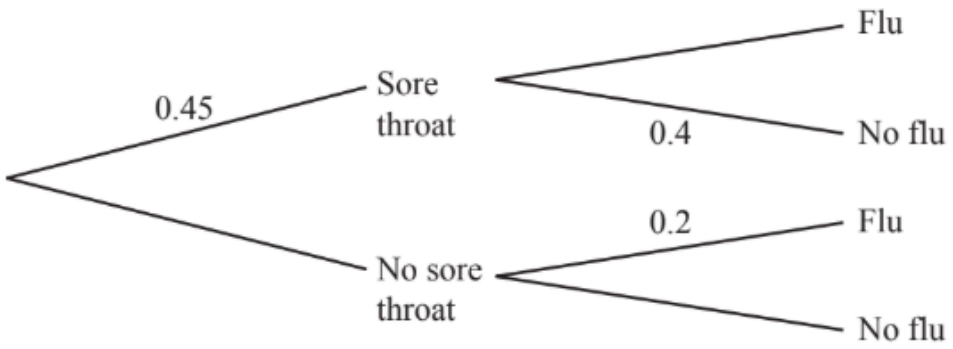
Answer(c)(i) ..... [2]

(ii) the interquartile range.

Answer(c)(ii) ..... hours [2]

12.

In a flu epidemic 45% of people have a sore throat.
If a person has a sore throat the probability of **not** having flu is 0.4.
If a person does not have a sore throat the probability of having flu is 0.2.



Calculate the probability that a person chosen at random has flu.

Answer ..... [4]

THE END / *KONEC*