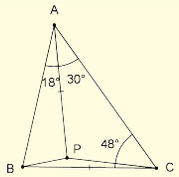
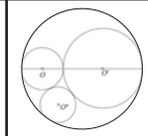
December 2015

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1 二十 1 is the multiplicative identity in the real numbers.	**2** 廿一 Let $f(x+4)=2x^2-7x+5$ and $f(x)=ax^2+bx+c$. Find $-a-3b-c$.	**3** 廿二 What is the third Heegner number?	**4** 廿三 Which number is the smallest composite number?	**5** 廿四 The smallest order of a non-cyclic simple group is the product of today's date and month.
6 廿五  Given that $AP=BC$, find the size of $\angle BCP$.	**7** 大雪 What is the minimum number of distinct rectangles with sides in the ratio 1:2 which will perfectly tile a rectangle?	**8** 廿七 Given that $\cos 20^\circ \cos 40^\circ \cos 80^\circ = \frac{1}{k}$, find k.	**9** 廿八 Find the number of derangements of $\{1, 2, 3, 4\}$.	**10** 廿九 Find an integer which is the closest to $\frac{e^\pi-\pi}{2}$.	**11** 冬月  If the radii of circles with centres O, O', O'' are 2, 3 and r where $r=\frac{p}{q}$ in lowest terms, find $p-q$.	**12** 初二 It is the number of Jacobian elliptic functions.
13 初三 One of the three known Wilson primes: p^2 divides $(p-1)!+1$.	**14** 初四 The least even number n such that the equation $\varphi(x)=n$ has no solution.	**15** 初五 If suffix array is used, we can check the existence of a text within 15 guesses in a passage of 15000 characters.	**16** 初六 16 is the 7th Pisano period.	**17** 初七 The number of integer solutions of $\frac{x+4}{2}>\frac{x+1}{3}$ and $x^2+4<100-4x$.	**18** 初八 Given that N is a three-digit number with non-zero distinct digits. Let g be the greatest common divisor of the six permutations of three-digits. Find max g.	**19** 初九 Maximum number of 4th powers needed to sum to any number is 19.
20 初十 20/20 vision means normal visual acuity.	**21** 十一 What is the maximum points in Blackjack without busting?	**22** 冬節 22 is the smallest Repunit composite number.	**23** 十三 $\underbrace{111\ldots1}_{23\text{ digits}}$ is a prime number.	**24** 十四 How many divisors does $2^{20}-1$ have?	**25** 聖誕節 Happy Halloween! (25 Dec = 31 Oct)	**26** 聖誕節翌日 $\lvert x+y\rvert+\lvert x-y\rvert=4$, find the maximum possible value of $x^2-10x+y^2$.
27 十七 This is the largest number that is the sum of the digits of its cube.	**28** 十八 It takes the Moon approximately 28 Earth days to orbit around the Earth.	**29** 十九 What is the largest number of regions we can get when we cut a circle by 7 straight lines?	**30** 二十 It is the largest number such that all co-primes smaller than itself, except for 1, are prime.	**31** 廿一 What is the smallest prime divisor of $x^2-10x+y^2$?		

57th IMO HONG KONG 2016

第五十七屆國際數學奧林匹克

57th International Mathematical Olympiad