

**Nr identyfikacyjny**   
SP FI – …………… – 2020/2021  
 (numer porządkowy z kodowania)

**Nr identyfikacyjny – wyjaśnienie -** *symbol przedmiotu* np. BI – biologia, *numer porządkowy wynika z numeru stolika wylosowanego przez ucznia*

WOJEWÓDZKI KONKURS PRZEDMIOTOWY   
Z FIZYKI

organizowany przez Łódzkiego Kuratora Oświaty   
dla uczniów szkół podstawowych w roku szkolnym 2020/2021

TEST – ETAP REJONOWY

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| * Arkusz liczy **14 stron** i zawiera **22 zadania,** w tym brudnopis. * Przed rozpoczęciem pracy sprawdź, czy Twój arkusz jest kompletny. Jeżeli zauważysz usterki, zgłoś je Komisji Konkursowej. * Zadania czytaj uważnie i ze zrozumieniem. * Odpowiedzi wpisuj długopisem bądź piórem, kolorem czarnym lub niebieskim. * Dbaj o czytelność pisma i precyzję odpowiedzi. * W zadaniach zamkniętych zaznacz prawidłową odpowiedź, wstawiając znak X we właściwym miejscu. * Jeżeli się pomylisz, błędne zaznaczenie otocz kółkiem i zaznacz znakiem X inną odpowiedź. * Oceniane będą tylko te odpowiedzi, które umieścisz w miejscu do tego przeznaczonym. * Do każdego numeru zadania podana jest maksymalna liczba punktów możliwa do uzyskania za prawidłową odpowiedź. * Pracuj samodzielnie. Postaraj się udzielić odpowiedzi na wszystkie pytania. * Nie używaj korektora. Jeśli pomylisz w zadaniach otwartych, przekreśl błędną odpowiedź i wpisz poprawną. * Korzystaj tylko z przyborów i materiałów określonych w regulaminie konkursu.   ***Powodzenia!*** | Czas pracy:  **90 min.** |

Imię i nazwisko ucznia

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Wypełnia Komisja Konkursowa po zakończeniu sprawdzenia prac

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| Zadanie | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Punkty możliwe do uzyskania | **6** | **3** | **3** | **1** | **2** | **4** | **4** | **1** | **7** | **2** | **3** | **11** | **5** | **1** | **11** | **8** | **4** | **4** |
| Punkty uzyskane |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| 19 | 20 | 21 | 22 | Razem |
| **6** | **6** | **5** | **3** | **100 pkt.** |
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Podpisy członków komisji sprawdzających prace:

1. (imię i nazwisko)………………………………………..(podpis) 2. (imię i nazwisko)………………………………………..(podpis)

Woda

Woda jest jednym z najważniejszych związków chemicznych występujących   
w przyrodzie. Bez wody niemożliwe byłoby życie człowieka i innych organizmów. Stanowi ona ponad 70% organizmu człowieka.

Woda może być także wykorzystana do pozyskania energii. Ponad 70% powierzchni Ziemi pokrywają oceany. Ale przecież są jeszcze jeziora i rzeki.

Woda bywa groźna. Gdy spadnie zbyt dużo deszczu może dojść do powodzi. Gdy pada deszcz, który zamarza nie tylko mamy śliskie drogi, ale także dochodzi do zerwania linii energetycznych. Nadmierna ilość śniegu na płaskich dachach budynków grozi ich zawaleniem. W sprzyjających warunkach w górach schodzą lawiny a na oceanie pojawiają się fale tsunami.

**We wszystkich zadaniach przyjmij do obliczeń:**

* **przyspieszenie ziemskie g=10 m/s2,**
* **gęstość wody d=1000 kg/m3, gęstość lodu 900kg/m3**
* **ciepło właściwe wody cw=4200 J/kgK, ciepło właściwe lodu cl=2100 J/kgK**
* **ciepło topnienie lodu L=335000 J/kg**

**Zadanie 1. (0- 6 pkt.)**

Woda w wodospadzie Niagara spada z wysokości h=53 m. **Oblicz szybkość wody   
u podstawy wodospadu. Wynik podaj z dokładnością do jednej cyfry po przecinku.**

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**Odpowiedź**…………………………………………….

**Zadanie 2. (0- 3 pkt.)**

Masa pewnej kropli deszczu wynosi 4.10-5kg, a jej energia kinetyczna podczas upadku na ziemię wynosi 7.10-4J. **Oblicz szybkość kropli deszczu w chwili upadku na ziemię.**

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**Odpowiedź**…………………………………………….

**Zadanie 3. (0-3 pkt.)**

Szybkość nurtu rzeki wynosi 2 m/s. **Oblicz odległość na jaką gałąź przesunie się wraz z nurtem rzeki w czasie 1 min.**

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**Zadanie 4. (0-1 pkt.)**

**Wyjaśnij dlaczego krople wody przyjmują kształt kulisty**.

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**Zadanie 5. (0-2 pkt.)**

Temperatura wody stosowanej do zaparzenia zielonej herbaty wynosi t=70oC. **Oblicz tę temperaturę w kelwinach.**

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**Odpowiedź**…………………………………………….

**Zadanie 6. (0-4 pkt.)**

**W oparciu o cząsteczkową budowę materii napisz, w której z wymienionych substancji cząsteczki oddziałują najsilniej, a w której najsłabiej**. Substancje to : woda o temperaturze 4oC, lód i para wodna. **Odpowiedź uzasadnij**.

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**Zadanie 7. (0- 4 pkt.)**

Wykres przedstawia zależność temperatury 0,5 kg wody od dostarczonego ciepła. **Nazwij każdy proces zachodzący pod wpływem dostarczonego ciepła Q1,Q2, Q3 i Q4. Nazwy procesów odpowiednio wpisz do tabeli.**



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| **Q1** |  |
| **Q2** |  |
| **Q3** |  |
| **Q4** |  |

**Zadanie 8. (0- 1 pkt.)**

Wykres przedstawia zależność temperatury t od dostarczonego ciepła Q dla 4 substancji o tej samej masie. **Wskaż substancję, która ma największe ciepło właściwe.**



1. **a B. b C. c D. d**

**Zadanie 9. (0- 7 pkt.)**

Basen o wymiarach 100m x 40m x 6m wypełniono całkowicie wodą o temperaturze 10oC. **Oblicz ilość ciepła, którą należy dostarczyć, aby temperatura wody w basenie wzrosła do 25oC.**

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**Odpowiedź**…………………………………………….

**Zadanie 10. (0-2 pkt.)**

W czasie upałów człowiek więcej się poci. **Wyjaśnij, w jaki sposób pocenie się chroni organizm przed przegrzaniem.**

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**Zadanie 11. (0-3 pkt.)**

Uczniowie podzieleni na trzy grupy wyznaczali objętość klucza do drzwi pracowni fizycznej. Pomiary zapisali w tabeli:

|  |  |
| --- | --- |
| **Nr pomiaru** | **Objętość klucza**  **(cm3)** |
| 1 | 1,7 |
| 2 | 1,8 |
| 3 | 1,7 |

**Oblicz objętość klucza. Wynik zapisz z niepewnością pomiaru.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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**Odpowiedź**……………………………………………

**Zadanie 12. (0-11 pkt.)**

Do dwóch naczyń w kształcie walca o polu podstawy S1=50 cm2 oraz S2=100 cm2 wlano po 1 litrze wody.

1. **Oblicz ciśnienie wywierane przez wodę na dno w każdym naczyniu. Naszkicuj te poziomy na rysunku.** (0-8 pkt)



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**Odpowiedź…………………………………………………………………………………….**

1. **Oblicz siłę nacisku wody na dno każdego naczynia.**

(0-3 pkt)

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**Odpowiedź…………………………………………………………………………………….**

**Zadanie 13. (0-5 pkt.)**

Do naczynia w kształcie litery U nalano wody. Następnie do jednego z ramion dolano oleju o gęstości d1=800 kg/m3. Wysokość słupa oleju wynosi 30 cm. **Oblicz o ile cm przesunął się słup wody w drugim ramieniu naczynia na skutek wlania oleju.**



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**Odpowiedź**…………………………………………….

**Zadanie 14. (0-1 pkt.)**

W mroźne zimowe dni (przy braku dalszych opadów śniegu) ilość śniegu leżącego na trawnikach zmniejsza się. **Podaj nazwę zjawiska, które powoduje zmniejszanie się ilości śniegu.**

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**Zadanie 15. (0-11 pkt.)**

Do czajnika elektrycznego o mocyP=2100 W i sprawności 80% wlano 0,5 l wody o temperaturze 20oC.

1. **Oblicz czas potrzebny do zagotowania wody w czajniku.** (0- 6 pkt.)

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**Odpowiedź**…………………………………………….

1. **Oblicz natężenie prądu płynącego przez grzałkę czajnika, jeżeli jest on włączony do napięcia 230V. Ustal czy bezpiecznik dziesięcioamperowy wyłączy napięcie w mieszkaniu, jeśli razem z czajnikiem włączymy elektryczną suszarkę do owoców o mocy 300 W.** (0- 5 pkt.)

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**Odpowiedź**…………………………………………….

**Zadanie 16. (0-8 pkt.)**

Do szklanki włożono kostkę lodu w kształcie sześcianu. Następnie dopełniono szklankę wodą. Kostka lodu pływa częściowo zanurzona tak, że 1/10 jej objętości wystaje nad powierzchnię wody.

1. **Narysuj, zachowując proporcje, siły działające na kostkę lodu i nazwij je.**

(0- 2 pkt.)



1. **Oblicz gęstość lodu.** (0- 5 pkt.)

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**Odpowiedź**…………………………………………….

1. **Napisz, czy po roztopieniu lodu woda wyleje się ze szklanki.**  (0- 1 pkt.)

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**Zadanie 17. (0-4 pkt.)**

Wykres przedstawia zależność ilości dostarczonego ciepła od temperatury wody t dla dwóch różnych mas wody m1 i m2.



* 1. **Posługując się wykresem ustal, która masa wody jest większa. Odpowiedź uzasadnij.** (0 - 2 pkt.)

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* 1. **Na wykresie powyżej naszkicuj wykres dla masy m3 mniejszej zarówno od masy m1 jak i od m2. Zapisz jednym słowem, w jaki sposób zmienia się kąt nachylenia wykresu α jeśli masa wody maleje.** (0 - 2 pkt.)

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**Zadanie 18. (0-4 pkt.)**

W naczyniach znajduje się woda o temperaturze umieszczonej pod naczyniem.

W kolejnych zdaniach opisujących rysunek **zaznacz** **P** - jeśli zdanie jest **prawdziwe** lub **F -**  jeśli jest **fałszywe**.

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| 1. Najmniejszą średnią energię kinetyczną mają cząsteczki wody w naczyniu 3. | **P** | **F** |
| 1. Jednakowe średnie energie kinetyczne mają cząsteczki wody w naczyniach 2 i 4. | **P** | **F** |
| 1. Największą energię wewnętrzną ma woda w naczyniu 1. | **P** | **F** |
| 1. Woda w naczyniu 2 i 4 ma taką samą energię wewnętrzną. | **P** | **F** |

**Zadanie 19. (0-6 pkt.)**

Na jednym końcu drewnianego kija zawieszono bryłę lodu o masie 3 kg, na drugim końcu torebkę z cukrem o masie 1 kg. Długość kija wynosi 1,2 m. **Ustal, w jakiej odległości od lodu podeprzeć kij, aby układ pozostał w równowadze.**



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**Odpowiedź**…………………………………………….

**Zadanie 20. (0-6 pkt.)**

Do dużej szklanki wrzucono 10 dag lodu o temperaturze -5oC. Następnie dolano 40 dag wody. Po stopieniu lodu woda w szklance miała temperaturę 8oC. **Oblicz temperaturę początkową wody.**

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**Odpowiedź**…………………………………………….

**Zadanie 21. (0-5 pkt.)**

Woda ma różną gęstość w różnych temperaturach. Masz do dyspozycji: wagę, wodę, cylinder z podziałką, dowolne naczynie na wodę. **Wymień kolejne czynności i zapisz obliczenia jakie należy wykonać, aby wyznaczyć gęstość wody w temperaturze pokojowej.**

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**Zadanie 22. (0-3 pkt.)**

Masz do dyspozycji: wodę, szklankę i kartkę papieru. Wymień kolejne czynności, aby zademonstrować istnienie ciśnienia atmosferycznego.

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